

# 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  $\Omega$  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

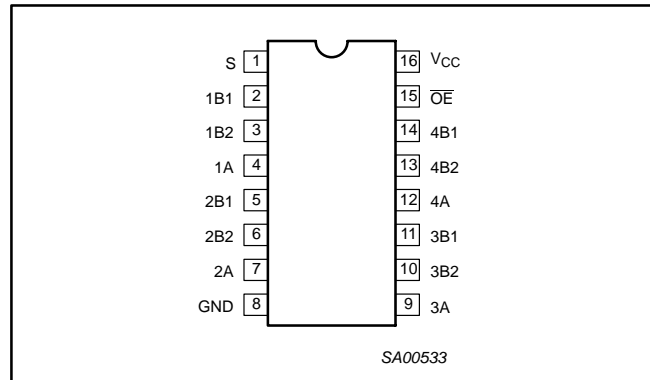
## DESCRIPTION

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

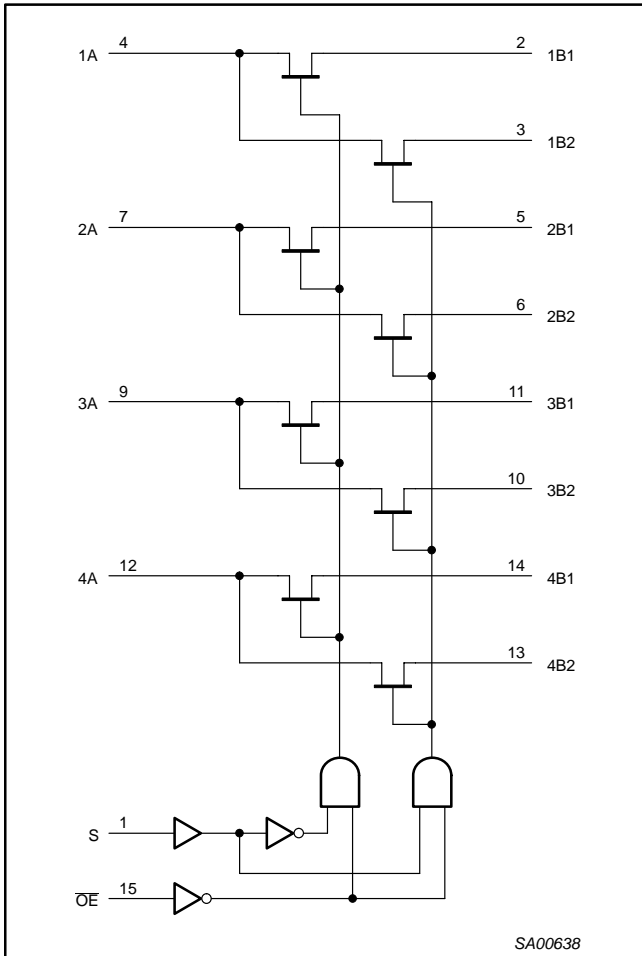
PACKAGES	TEMPERATURE RANGE	ORDER CODE	TOPSIDE MARK	DWG NUMBER
16-pin plastic SO	-40 to 85 $^{\circ}\text{C}$	CBT3257D	CBT3257D	SOT109-1
16-pin plastic SSOP	-40 to 85 $^{\circ}\text{C}$	CBT3257DB	CT3257	SOT338-1
16-pin plastic SSOP (QSOP)	-40 to 85 $^{\circ}\text{C}$	CBT3257DS	CBT3257	SOT519-1
16-pin 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](http://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 RATINGS<sup>1</sup>

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
$V_{CC}$	DC supply voltage		-0.5 to +7.0	V
$V_I$	DC input voltage <sup>2</sup>		-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
			$T_{amb} = -40 \text{ to } +85 \text{ } ^\circ\text{C}$			
			MIN	TYP <sup>1</sup>	MAX	
$V_{IK}$	Input clamp voltage	$V_{CC} = 4.5 \text{ V}; I_I = -18 \text{ mA}$	—	—	-1.2	V
$V_P$	Pass voltage	$V_I = V_{CC} = 5.0 \text{ V}; I/O = -100 \text{ mA}$	3.4	3.6	3.9	V
$I_I$	Input leakage current	$V_{CC} = 5.5 \text{ V}; V_I = \text{GND or } 5.5 \text{ V}$	—	—	$\pm 1$	$\mu\text{A}$
$I_{CC}$	Quiescent supply current	$V_{CC} = 5.5 \text{ V}; I_O = 0, V_I = V_{CC} \text{ or GND}$	—	—	3	$\mu\text{A}$
$\Delta I_{CC}$	Additional supply current per input pin <sup>2</sup>	$V_{CC} = 5.5 \text{ V}$ , one input at 3.4 V, other inputs at $V_{CC}$ or GND	—	—	2.5	mA
$C_I$	Control pins	$V_I = 3 \text{ V or } 0$	—	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	$V_{CC} = 4.5 \text{ V}; V_I = 0\text{V}; I_I = 64 \text{ mA}$	—	5	7	$\Omega$
		$V_{CC} = 4.5 \text{ V}; V_I = 0\text{V}; I_I = 30 \text{ mA}$	—	5	7	$\Omega$
		$V_{CC} = 4.5 \text{ V}; V_I = 2.4 \text{ V}; I_I = 15 \text{ mA}$	—	10	15	$\Omega$

## NOTES:

- All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_{amb} = 25 \text{ } ^\circ\text{C}$ .
- 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

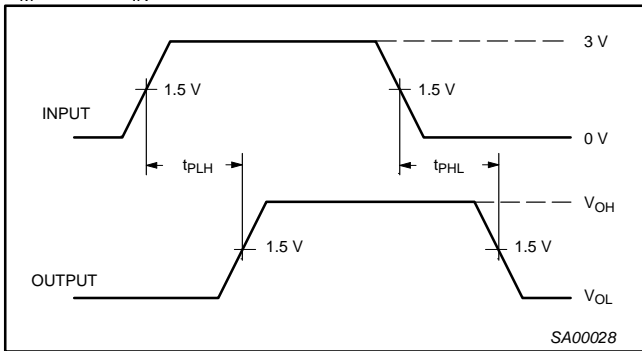
SYMBOL	PARAMETER	FROM (INPUT)	TO (OUTPUT)	LIMITS		UNIT
				$V_{CC} = +5.0\text{ V} \pm 0.5\text{ V}$		
				MIN	MAX	
$t_{pd}$	Propagation delay <sup>1</sup>	A or B	B or A	—	0.25	ns
$t_{pd}$	Propagation delay	S	A	1.6	5.0	ns
$t_{en}$	Output enable time to High and Low level	$\overline{OE}$	A or B	1.8	5.1	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:**

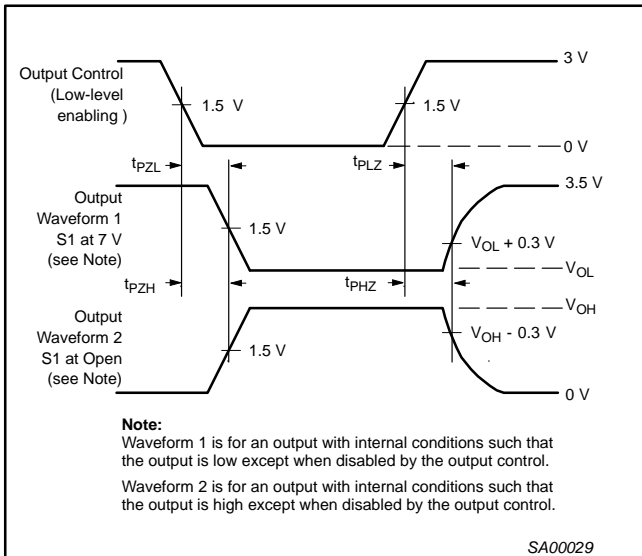
1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

## AC WAVEFORMS

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



**Waveform 1. Input to Output Propagation Delays**

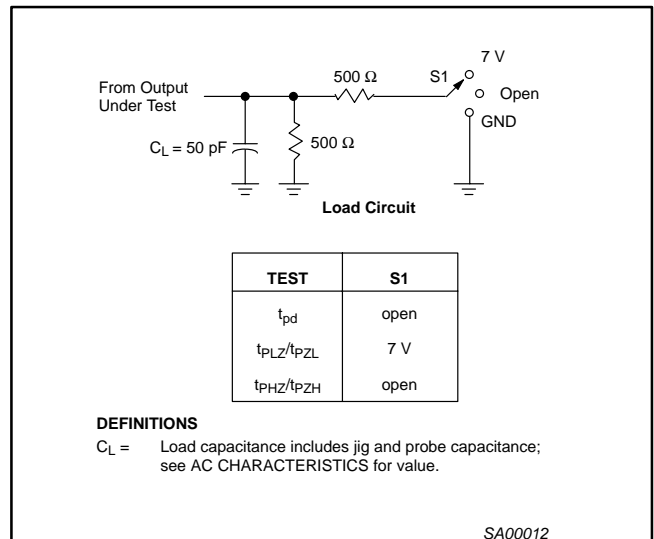


**Waveform 2. 3-State Output Enable and Disable Times**

**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:**

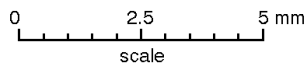
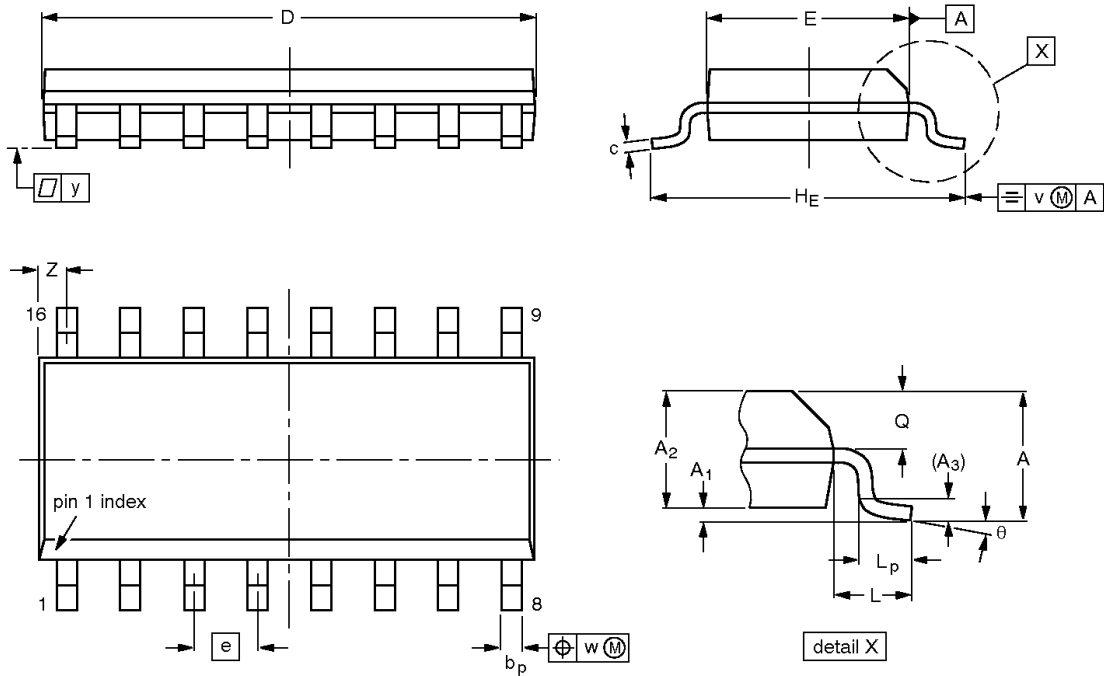
1. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 2.5\text{ ns}$ ,  $t_f \leq 2.5\text{ ns}$ .
2. The outputs are measured one at a time with one transition per measurement.

# 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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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.

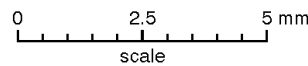
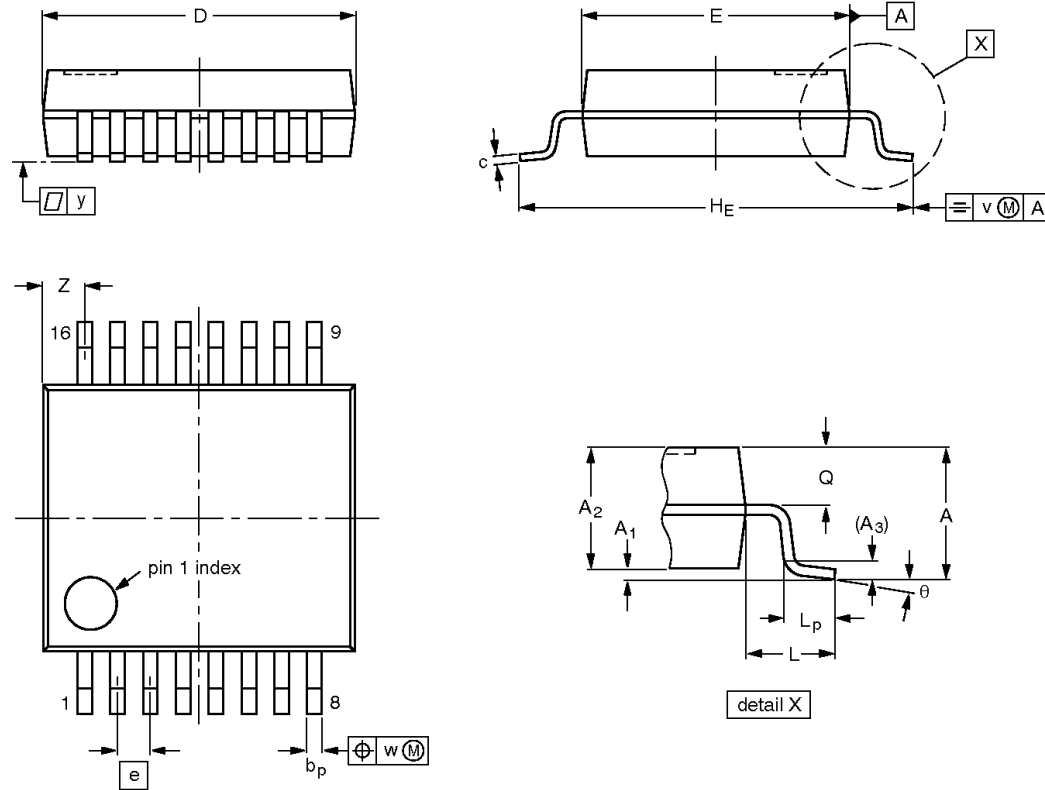
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT109-1	076E07	MS-012				<del>97-05-22</del> 99-12-27

# 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 <sub>max.</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	$\theta$
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.

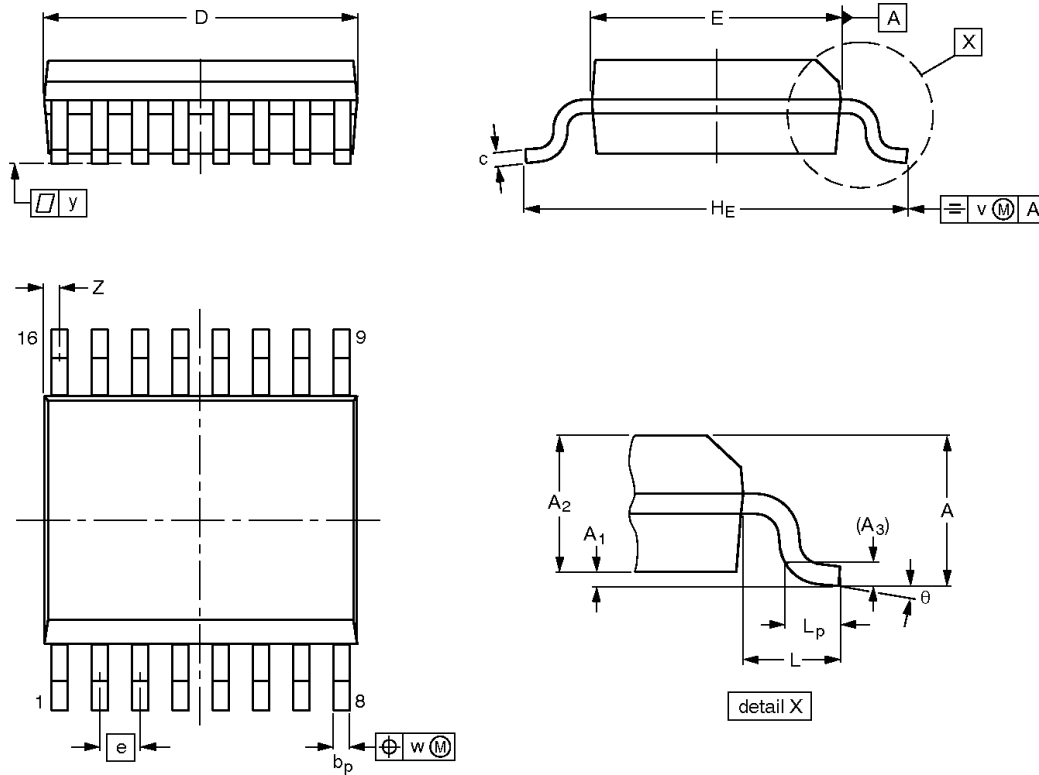
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT338-1		MO-150				95-02-04 99-12-27

# 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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	v	w	y	Z <sup>(1)</sup>	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

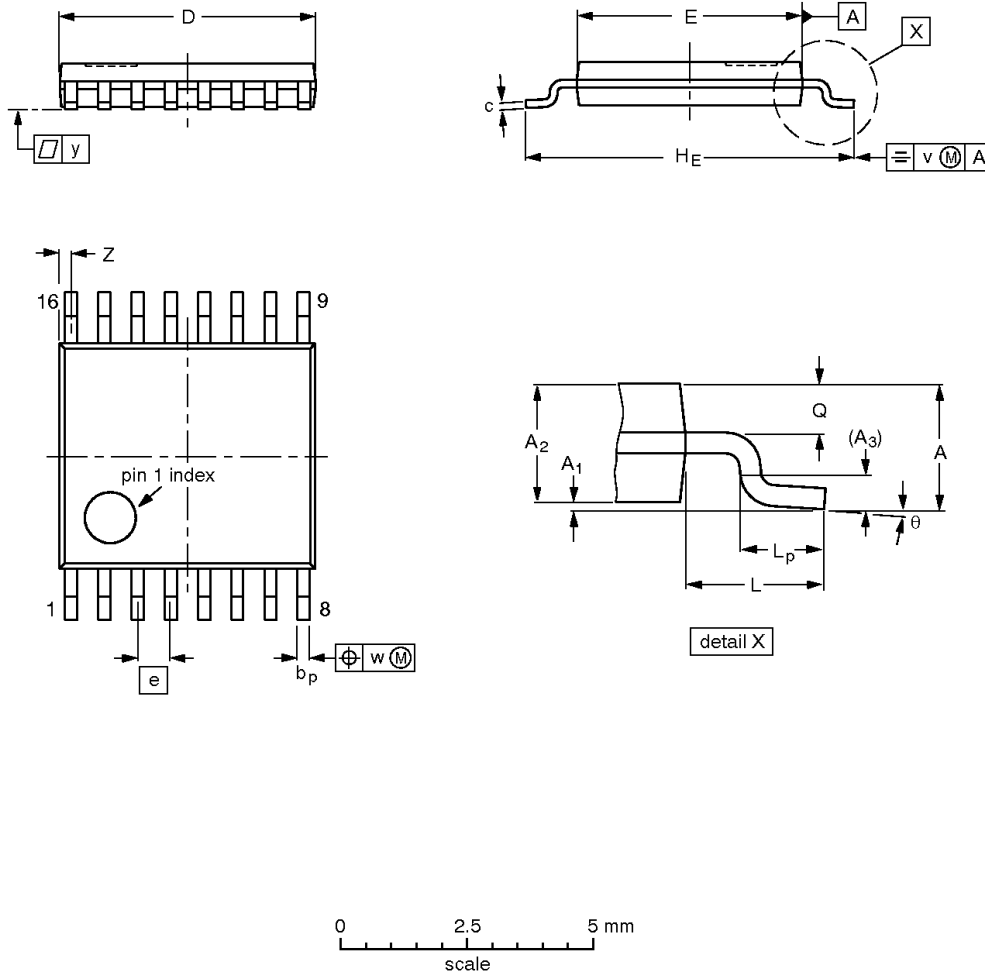


# Quad 1-of-2 multiplexer/demultiplexer

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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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"><li>• Corrections to Block Diagram graphic.</li></ul>
_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 <sup>[1]</sup>	Product status <sup>[2]</sup> [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.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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