

DATA SHEET

CBT3253

Dual 1-of-4 FET multiplexer/demultiplexer

Product data

2002 Nov 04

Dual 1-of-4 FET multiplexer/demultiplexer

CBT3253

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 JESDEC Standard JESD78 which exceeds 100 mA

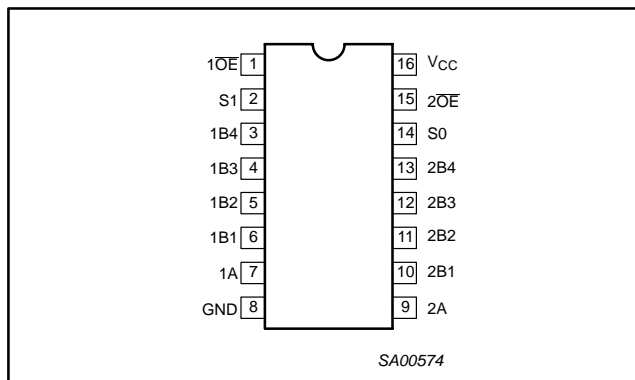
DESCRIPTION

The CBT3253 is a dual 1-of-4 high-speed TTL-compatible FET 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.

$1\overline{OE}$, $2\overline{OE}$, S0, and S1 select the appropriate B output for the A-input data.

The CBT3251 is characterized for operation from -40 to $+85^\circ\text{C}$.

PIN CONFIGURATION



PIN DESCRIPTION

| PIN NUMBER | SYMBOL | NAME AND FUNCTION |
|----------------|------------------|-------------------------|
| 1 | $1\overline{OE}$ | Output enable |
| 2 | S1 | Select-control input |
| 3, 4, 5, 6 | $1B[1-4]$ | B outputs |
| 7 | 1A | A input |
| 8 | GND | Ground (0 V) |
| 9 | 2A | A input |
| 10, 11, 12, 13 | $2B[1-4]$ | Select-control input |
| 14 | S0 | Select-control input |
| 15 | $2\overline{OE}$ | Output enable |
| 16 | V_{CC} | Positive supply voltage |

ORDERING INFORMATION

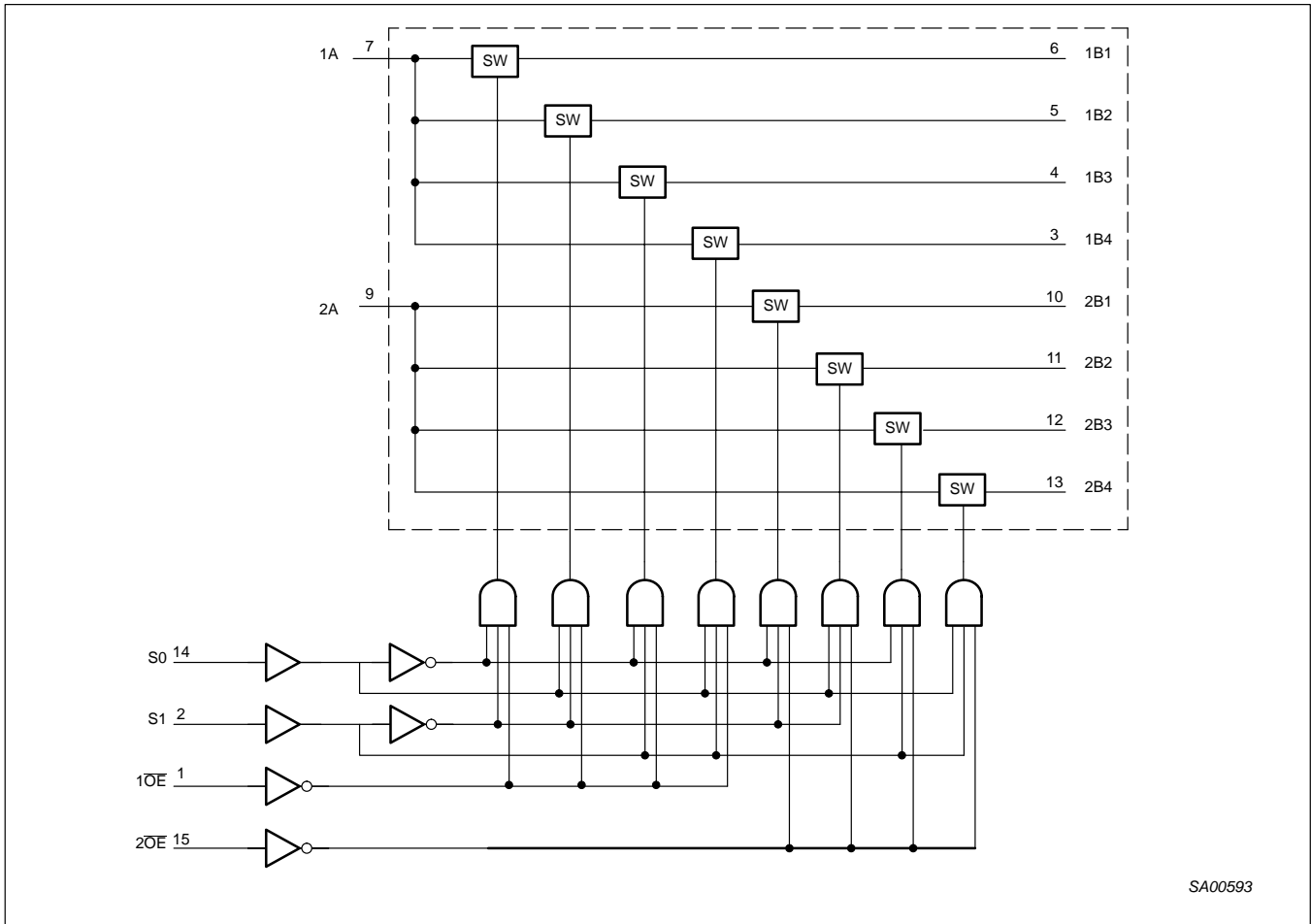
| PACKAGES | TEMPERATURE RANGE | ORDER CODE | TOPSIDE MARK | DWG NUMBER |
|----------------------------|-----------------------------|------------|--------------|------------|
| 16-pin plastic SO | -40 to 85°C | CBT3253D | CBT3253D | SOT109-1 |
| 16-pin plastic SSOP | -40 to 85°C | CBT3253DB | CT3253 | SOT338-1 |
| 16-pin plastic SSOP (QSOP) | -40 to 85°C | CBT3253DS | CBT3253 | SOT519-1 |
| 16-pin plastic TSSOP | -40 to 85°C | CBT3253PW | CBT3253 | SOT403-1 |

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

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LOGIC DIAGRAM (positive logic)



SA00593

FUNCTION TABLE

| INPUTS | | | | FUNCTION |
|--------|-----|----|----|-------------------------|
| OE1 | OE2 | S1 | S0 | |
| H | X | X | X | Disconnect 1A |
| X | H | X | X | Disconnect 2A |
| L | L | L | L | 1A to 1B1 and 2A to 2B1 |
| L | L | L | H | 1A to 1B2 and 2A to 2B2 |
| L | L | H | L | 1A to 1B3 and 2A to 2B3 |
| L | L | H | H | 1A to 1B4 and 2A to 2B4 |

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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 | — | 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 ¹ | MAX | | |
| V_{IK} | Input clamp voltage | $V_{CC} = 4.5 \text{ V}; I_I = -18 \text{ mA}$ | — | — | -1.2 | V | |
| V_P | Pass voltage | $V_I = V_{CC} = 5.5 \text{ V}; I/O = -100 \text{ } \mu\text{A}$ | 3.4 | 3.6 | 3.9 | V | |
| I_I | Input leakage current | $V_{CC} = 5 \text{ V}; V_I = 5.5 \text{ or GND}$ | — | — | ± 1 | μA | |
| I_{CC} | Quiescent supply current | $V_{CC} = 5.5 \text{ V}; I_O = 0, V_I = V_{CC} \text{ or GND}$ | — | — | 3 | μA | |
| ΔI_{CC} | Control inputs ² | $V_{CC} = 5.5 \text{ V}$, one input at 3.4 V, other inputs at V_{CC} or GND | — | — | 2.5 | mA | |
| C_I | Control pins | $V_I = 3 \text{ V or } 0$ | — | 4.5 | — | pF | |
| $C_{IO(OFF)}$ | Power-off leakage current | A port | — | 23.5 | — | pF | |
| | | B port | — | 6.5 | — | | |
| r_{on}^3 | On-resistance | $V_{CC} = 4.5 \text{ V}$ | $V_I = 0 \text{ V}; I_I = 64 \text{ mA}$ | — | 5 | 7 | Ω |
| | | | $V_I = 0 \text{ V}; I_I = 30 \text{ mA}$ | — | 5 | 7 | |
| | | | $V_I = 2.4 \text{ V}; I_I = -15 \text{ mA}$ | — | 10 | 15 | |

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.

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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 |
| | | S | A or B | 1.2 | 6.2 | |
| t_{en} | Output enable time to High and Low level | S | A or B | 1.3 | 6.3 | ns |
| | | \overline{OE} | | 1.4 | 6.4 | |
| t_{dis} | Output disable time from High and Low level | S | A or B | 1.1 | 7.2 | ns |
| | | \overline{OE} | | 1.0 | 7 | |

NOTE:

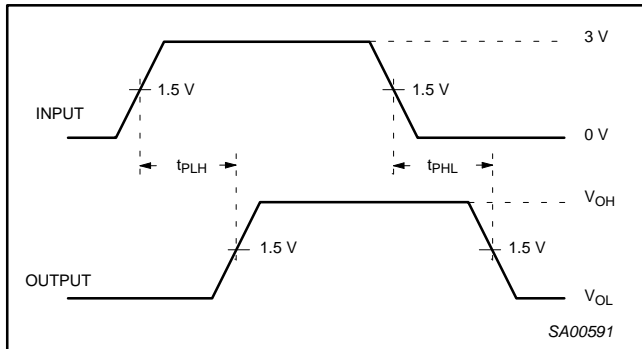
1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

Dual 1-of-4 FET multiplexer/demultiplexer

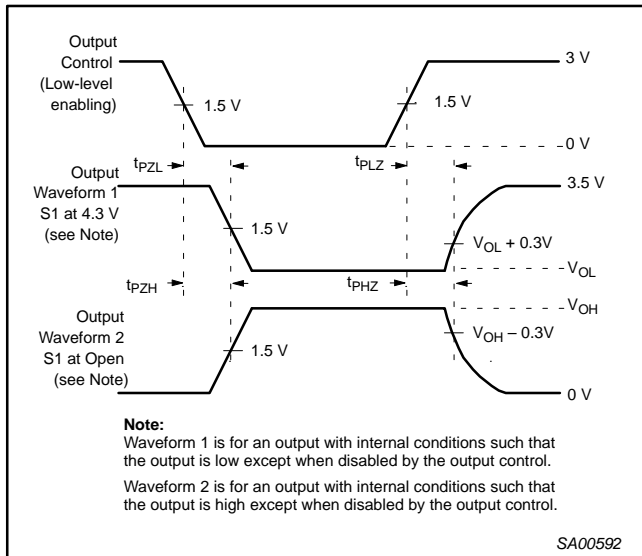
CBT3253

AC WAVEFORMS

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



Waveform 1. Pulse duration

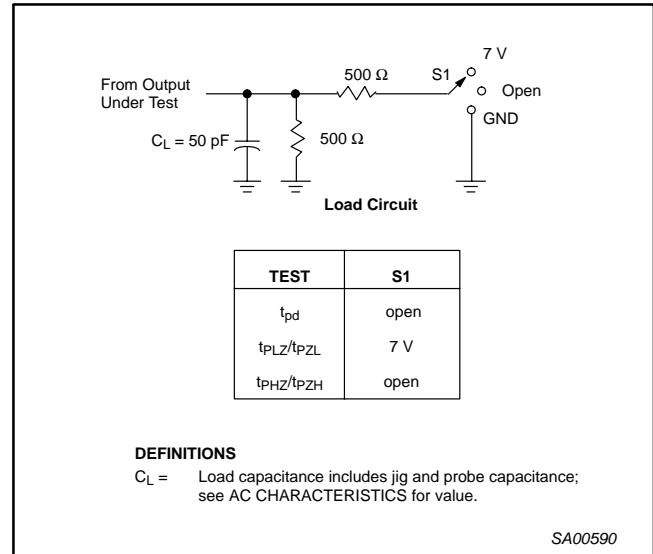


Waveform 2. 3-State Output Enable and Disable Times

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:

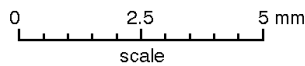
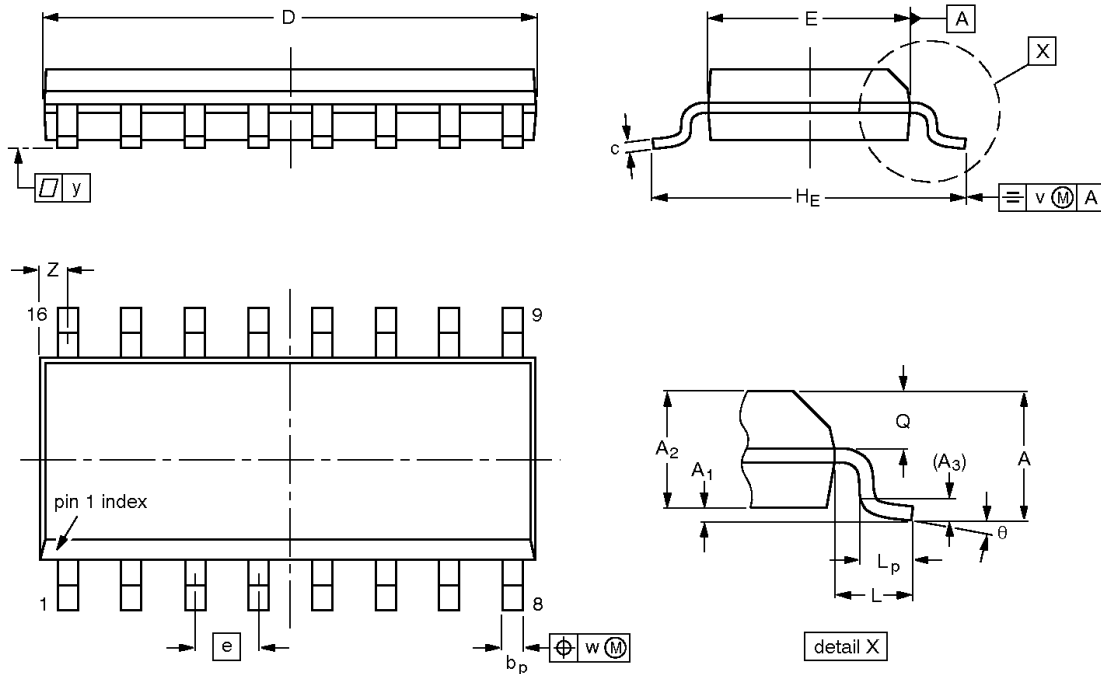
1. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$.
2. The outputs are measured one at a time with one transition per measurement.

Dual 1-of-4 FET multiplexer/demultiplexer

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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.

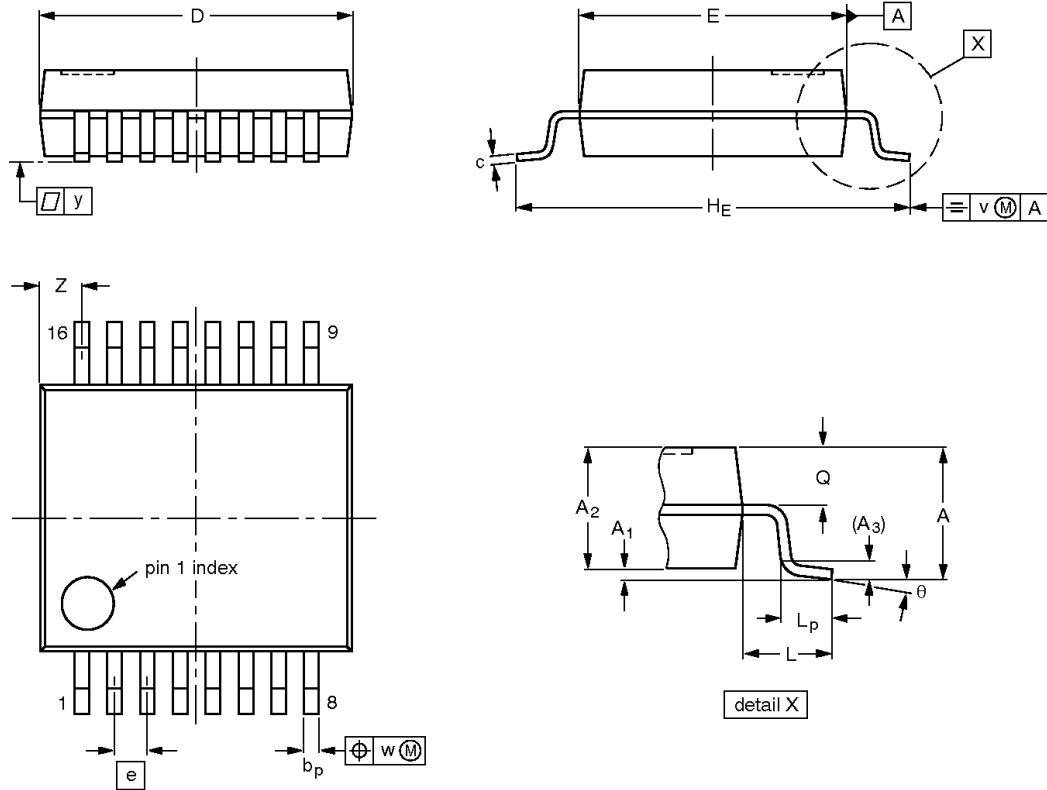
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|--|---------------------|---------------------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT109-1 | 076E07 | MS-012 | | | | 97-05-22 99-12-27 |

Dual 1-of-4 FET multiplexer/demultiplexer

CBT3253

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.

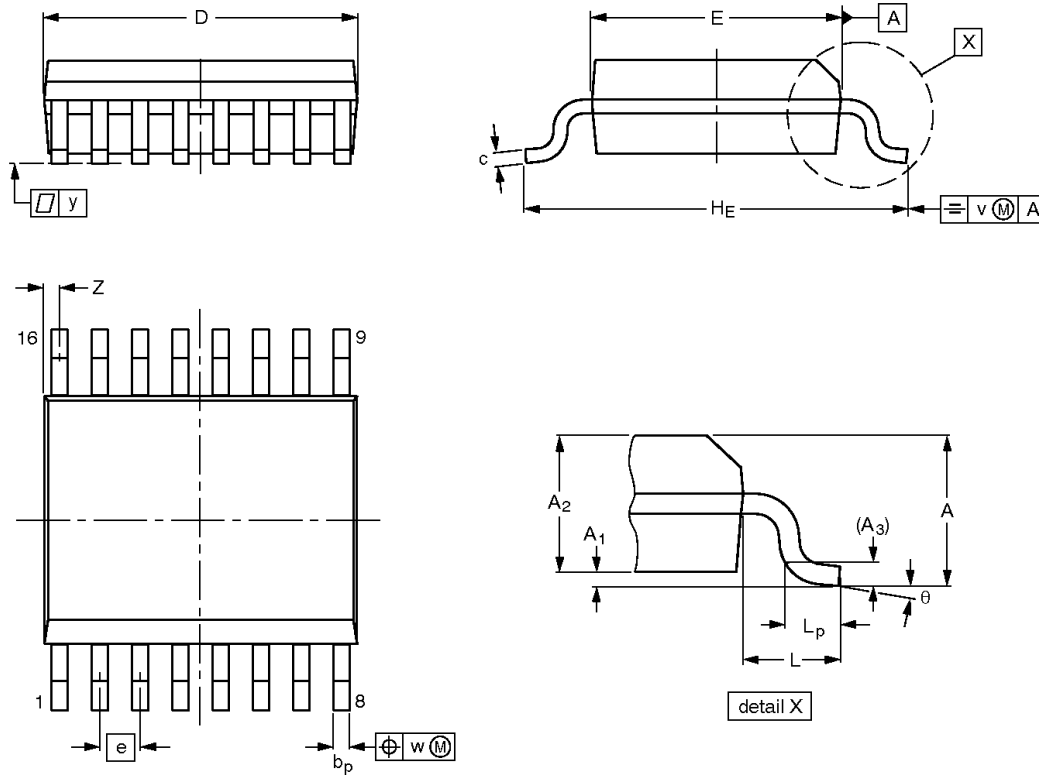
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT338-1 | | MO-150 | | | | 95-02-04 99-12-27 |

Dual 1-of-4 FET multiplexer/demultiplexer

CBT3253

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.

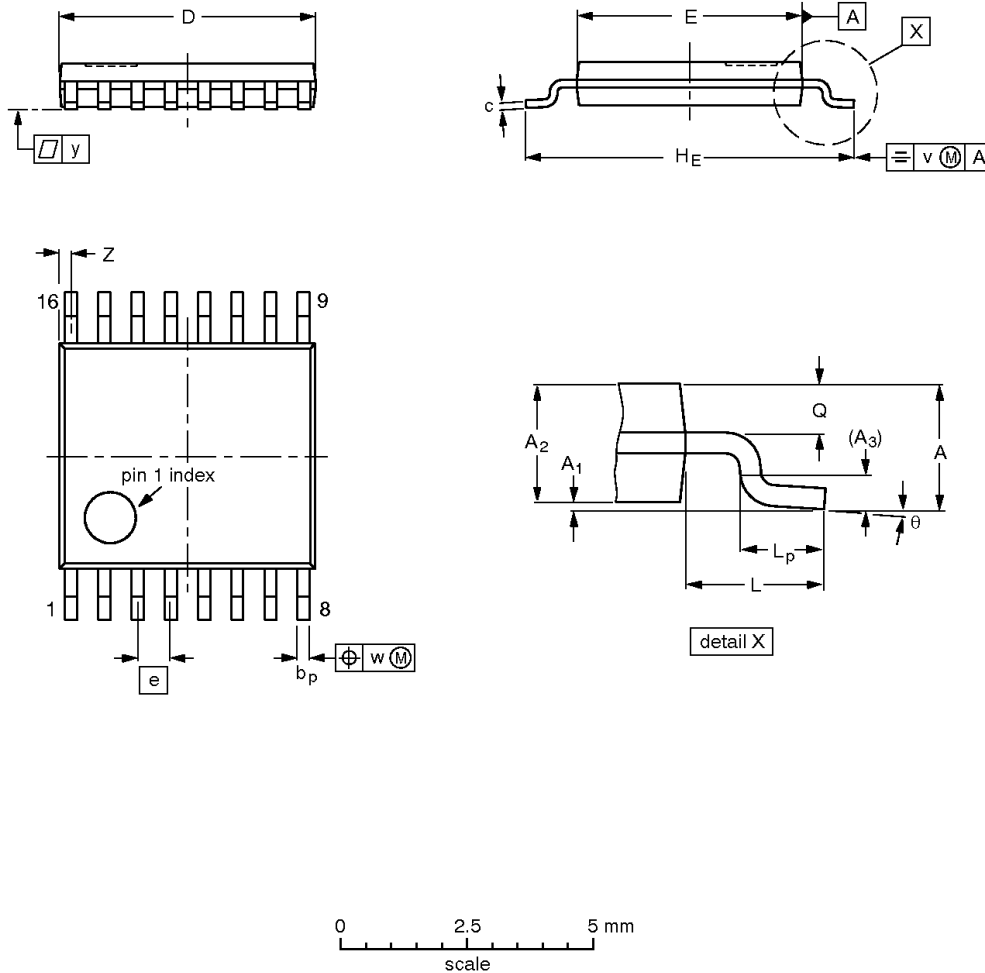
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|------|--|------------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT519-1 | | | | | | 99-05-04 |

Dual 1-of-4 FET multiplexer/demultiplexer

CBT3253

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 |

Dual 1-of-4 FET multiplexer/demultiplexer

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REVISION HISTORY

| Rev | Date | Description |
|-----|-------------|---|
| _1 | 2002 Nov 04 | Product data (9397 750 10664); initial version Engineering Change Notice: 853-2389 29065 (2002 Oct 15) |

Dual 1-of-4 FET multiplexer/demultiplexer

CBT3253

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. |
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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.

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