

DATA SHEET

CBT3244A

Octal bus switch with quad output enables

Product data sheet

2004 May 26



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CBT3244A

FEATURES

- Standard '244-type pinout
- 5 Ω switch connection between two ports
- TTL compatible control input levels
- Package options include plastic small outline (D), shrink small outline (DB), QSOP (DS), and thin shrink small outline (TSSOP)
- Latch-up protection exceeds 500 mA per JESD78
- ESD protection exceeds 1000 V HBM per JESD22-A114, 200 V MM per JESD22-A115 and 1000 V CDM per JESD22-C101

DESCRIPTION

The CBT3244A provides eight bits of high-speed TTL-compatible bus switching in a standard '244 device pinout. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The CBT3244A device is organized as two 4-bit low-impedance switches with separate output-enable (\overline{OE}) inputs. When \overline{OE} is LOW, the switch is on and data can flow from port A to port B, or vice versa. When \overline{OE} is HIGH, the switch is open and high-impedance state exists between the two ports.

The CBT3244A is characterized for operation from -40 °C to 85 °C.

PIN CONFIGURATION — SO, SSOP, QSOP, and TSSOP

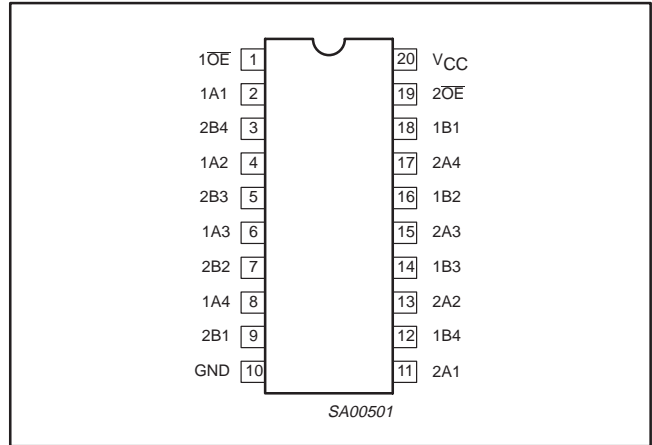


Figure 1. Pin configuration — SO, SSOP, QSOP, and TSSOP

PIN DESCRIPTION

| PIN NUMBER | SYMBOL | NAME AND FUNCTION |
|----------------|-----------------|-------------------------|
| 1, 19 | 1OE, 2OE | Output enable |
| 2, 4, 6, 8 | 1A1–1A4 | Inputs |
| 11, 13, 15, 17 | 2A1–2A4 | Inputs |
| 18, 16, 14, 12 | 1B1–1B4 | Outputs |
| 9, 7, 5, 3 | 2B1–2B4 | Outputs |
| 10 | GND | Ground (0V) |
| 20 | V _{CC} | Positive supply voltage |

ORDERING INFORMATION

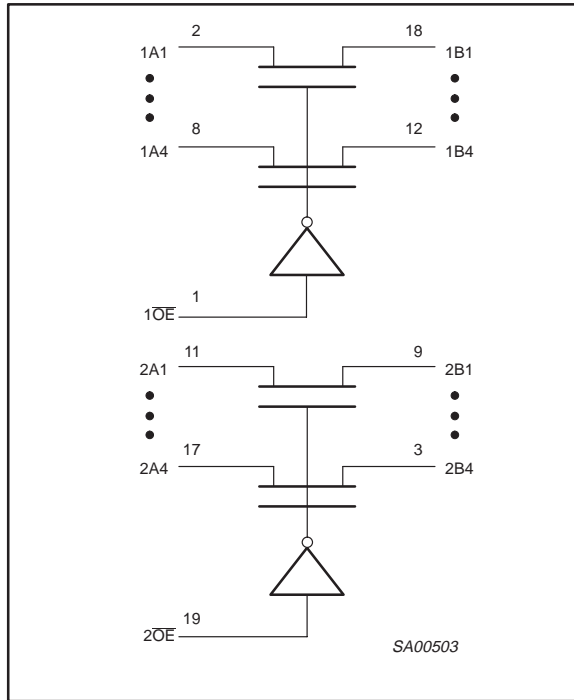
| PACKAGES | TEMPERATURE RANGE | ORDER CODE | TOPSIDE MARK | DWG NUMBER |
|----------------------------|-------------------|------------|--------------|------------|
| 20-Pin Plastic TSSOP | -40 °C to 85 °C | CBT3244APW | CT3244A | SOT360-1 |
| 20-Pin Plastic SSOP (QSOP) | -40 °C to 85 °C | CBT3244ADS | CT3244ADS | SOT724-1 |
| 20-Pin Plastic SSOP | -40 °C to 85 °C | CBT3244ADB | CT3244A | SOT339-1 |
| 20-Pin Plastic SO | -40 °C to 85 °C | CBT3244AD | CBT3244AD | SOT163-1 |

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

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LOGIC SYMBOL



FUNCTION TABLE

| INPUTS | | OUTPUTS | |
|--------|-----|---------|---------|
| 1OE | 2OE | 1A, 1B | 2A, 2B |
| L | L | 1A = 1B | 2A = 2B |
| L | H | 1A = 1B | Z |
| H | L | Z | 2A = 2B |
| H | H | Z | Z |

H = High voltage level
 L = Low voltage level
 Z = High-impedance "off" state

ABSOLUTE MAXIMUM RATINGS^{1, 2}

| SYMBOL | PARAMETER | CONDITIONS | RATING | UNIT |
|------------------|--------------------------------|-----------------------------|--------------|------|
| V _{CC} | DC supply voltage | | -0.5 to +7.0 | V |
| I _{IK} | DC input diode current | V _I < 0 V | -18 | mA |
| V _I | DC input voltage ³ | | -1.2 to +7.0 | V |
| I _{OK} | DC output diode current | V _O < 0 V | -50 | mA |
| V _{OUT} | DC output voltage ³ | output in Off or HIGH state | -0.5 to +7 | V |
| I _{OUT} | DC output current | output in LOW state | 128 | mA |
| T _{stg} | Storage temperature range | | -65 to 150 | °C |

NOTES:

1. 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.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output 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 |

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DC ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | TEST CONDITIONS | LIMITS | | | UNIT |
|-----------------|--|---|--|------------------|---------|---------------|
| | | | $T_{amb} = -40\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$ | | | |
| | | | Min | Typ ¹ | Max | |
| V_{IK} | Input clamp voltage | $V_{CC} = 4.5\text{ V}; I_I = -18\text{ mA}$ | — | — | -1.2 | V |
| I_I | Input leakage current | $V_{CC} = 5.5\text{ V}; V_I = \text{GND or }5.5\text{ V}$ | — | — | ± 1 | μA |
| I_{CC} | Quiescent supply current | $V_{CC} = 5.5\text{ V}; I_O = 0, V_I = V_{CC}\text{ or GND}$ | — | 1 | 3 | μA |
| ΔI_{CC} | Additional supply current per input pin 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 input capacitance | $V_I = 3\text{ V or }0\text{ V}, \overline{OE} = V_{CC}$ | — | 3 | — | pF |
| $C_{IO(OFF)}$ | Input/output capacitance | $\overline{OE} = V_{CC} = 5.0\text{ V}$ | — | 3 | — | pF |
| r_{on}^3 | On-resistance | $V_{CC} = 4.5\text{ V}; V_I = 0\text{ V}; I_I = 64\text{ mA}$ | — | 4 | 7 | Ω |
| | | $V_{CC} = 4.5\text{ V}; V_I = 0\text{ V}; I_I = 30\text{ mA}$ | — | 4 | 7 | |
| | | $V_{CC} = 4.5\text{ V}; V_I = 2.4\text{ V}; I_I = 15\text{ mA}$ | — | 8 | 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.

AC CHARACTERISTICS

GND = 0 V; t_R ; $C_L = 50\text{ pF}$

| SYMBOL | PARAMETER | FROM (INPUT) | TO (OUTPUT) | LIMITS | | UNIT |
|-----------|---|--------------|-------------|---|-----|------|
| | | | | $T_{amb} = -40\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$ $V_{CC} = +5.0\text{ V} \pm 0.5\text{ V}$ | | |
| | | | | Min | Max | |
| t_{pd} | Propagation delay ¹ | A or B | B or A | — | .25 | ns |
| t_{en} | Output enable time to HIGH and LOW level | OE | A or B | 1.0 | 5.6 | ns |
| t_{dis} | Output disable time from HIGH and LOW level | OE | A or B | 1.0 | 6.0 | ns |

NOTE:

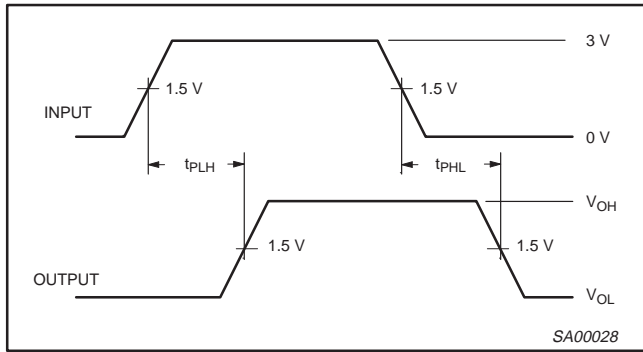
- This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical on-state resistance of the switch and a load capacitance of 50 pF, when driven by an ideal voltage source (zero output impedance).

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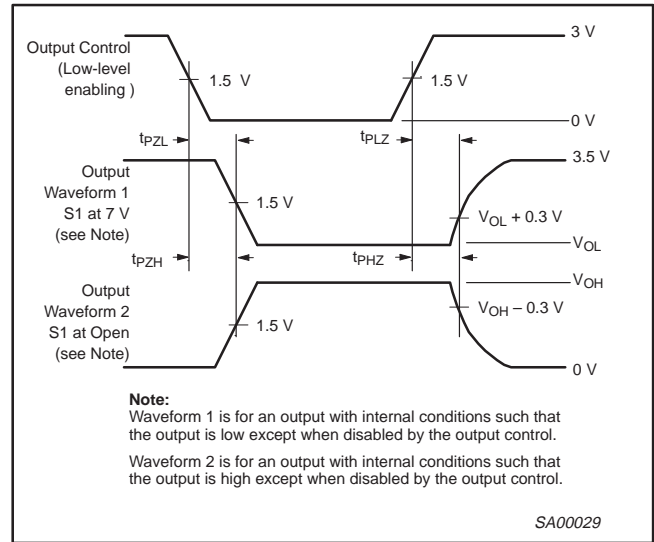
CBT3244A

AC WAVEFORMS

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

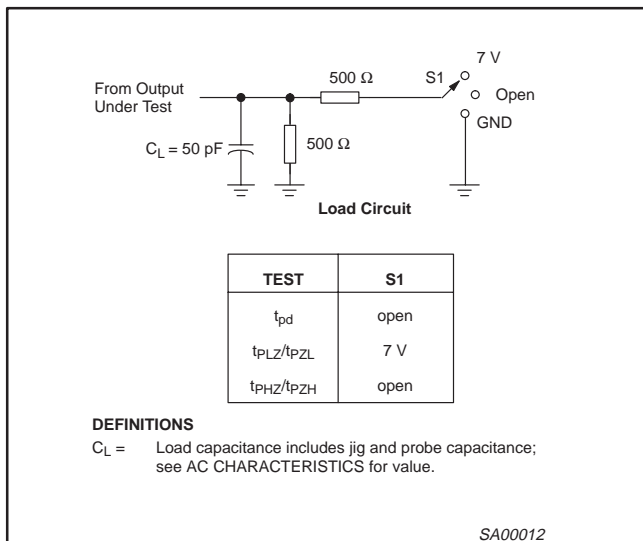


Waveform 1. Input to Output Propagation Delays



Waveform 2. 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS



NOTES:

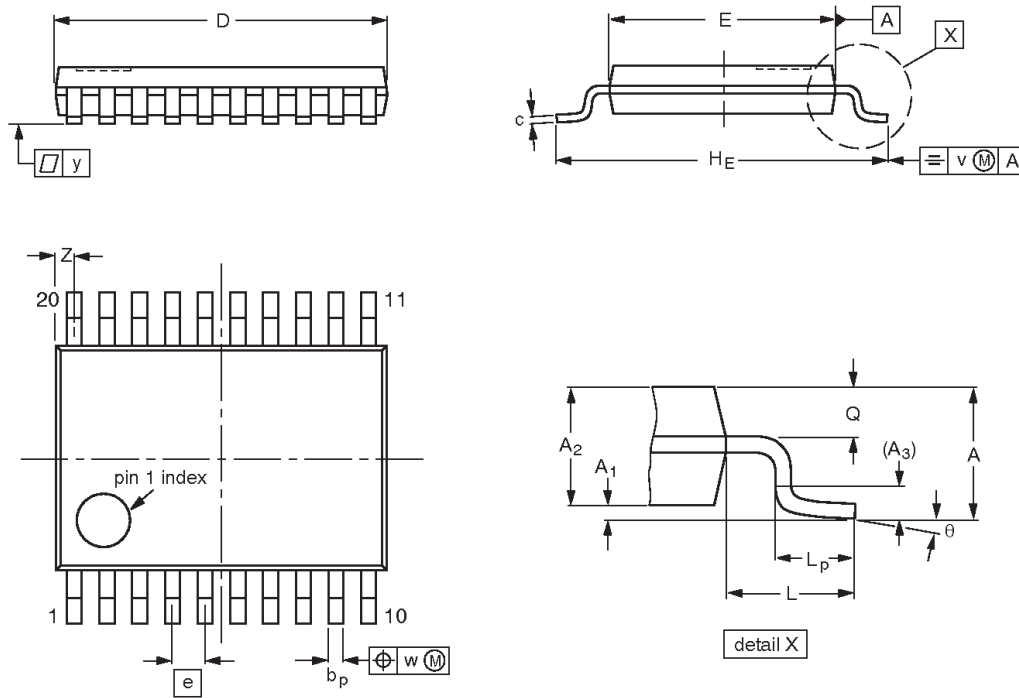
1. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$.
2. The outputs are measured one at a time with one transition per measurement.

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TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1



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 | 6.6 6.4 | 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 | 0.5 0.2 | 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.

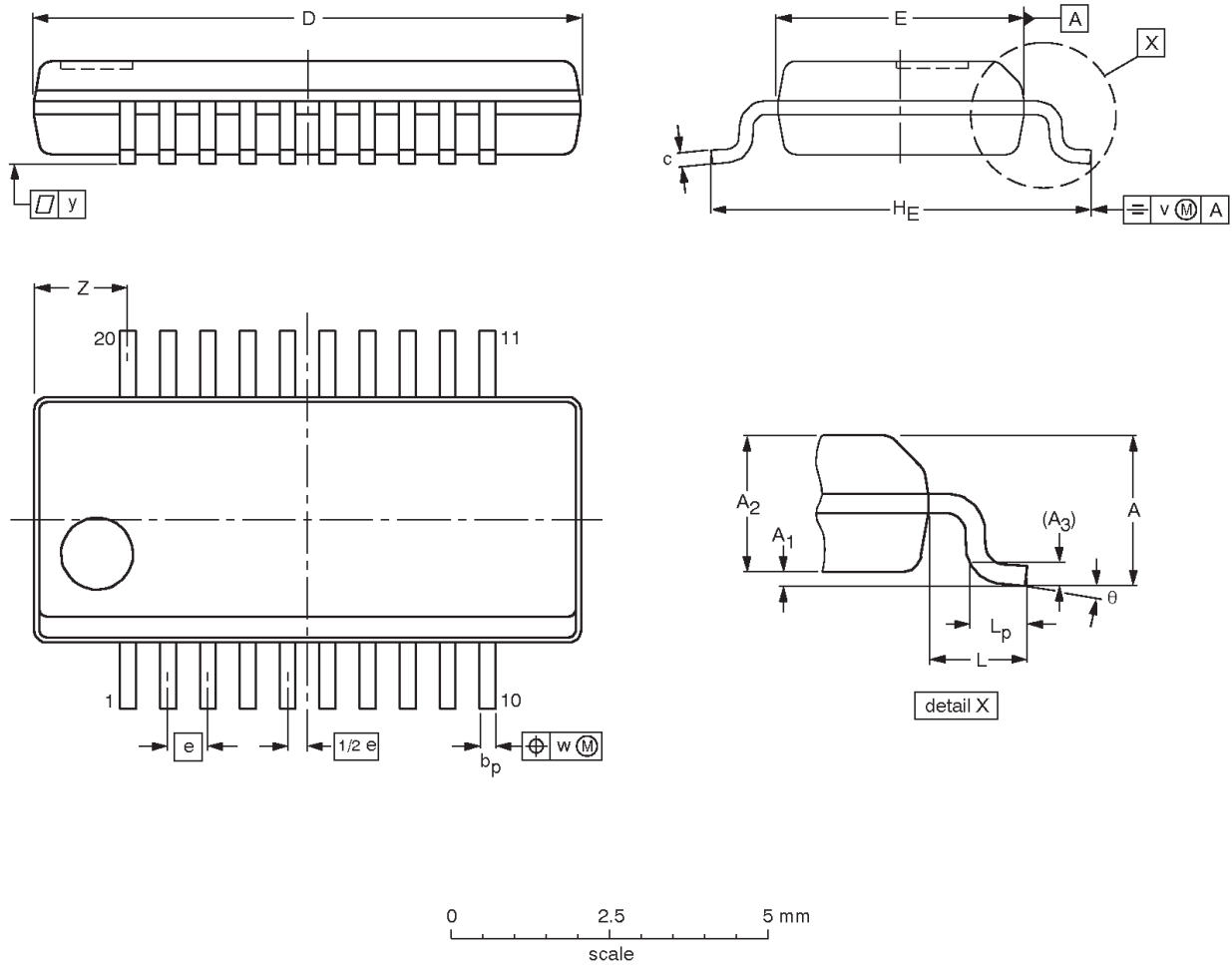
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT360-1 | | MO-153 | | | | 99-12-27 03-02-19 |

Octal bus switch with quad output enables

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SSOP20: plastic shrink small outline package; 20 leads;
body width 3.9 mm; lead pitch 0.635 mm

SOT724-1



DIMENSIONS (millimetre dimensions are derived from the original inch 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 | 8.8 8.6 | 4.0 3.8 | 0.635 | 6.2 5.8 | 1 | 0.89 0.41 | 0.25 | 0.18 | 0.1 | 1.67 1.28 | 8° 0° |

Note

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

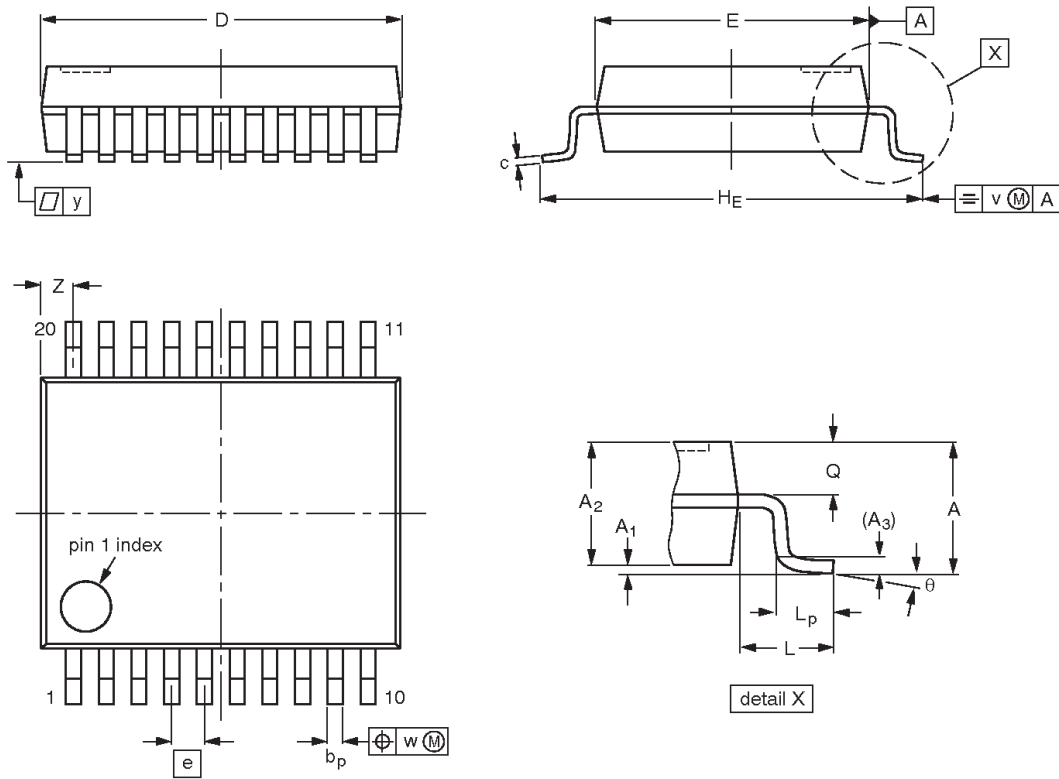
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT724-1 | | MO-137 | | | | 01-07-04 03-02-18 |

Octal bus switch with quad output enables

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SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | HE | 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 | 7.4 7.0 | 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 | 0.9 0.5 | 8° 0° |

Note

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

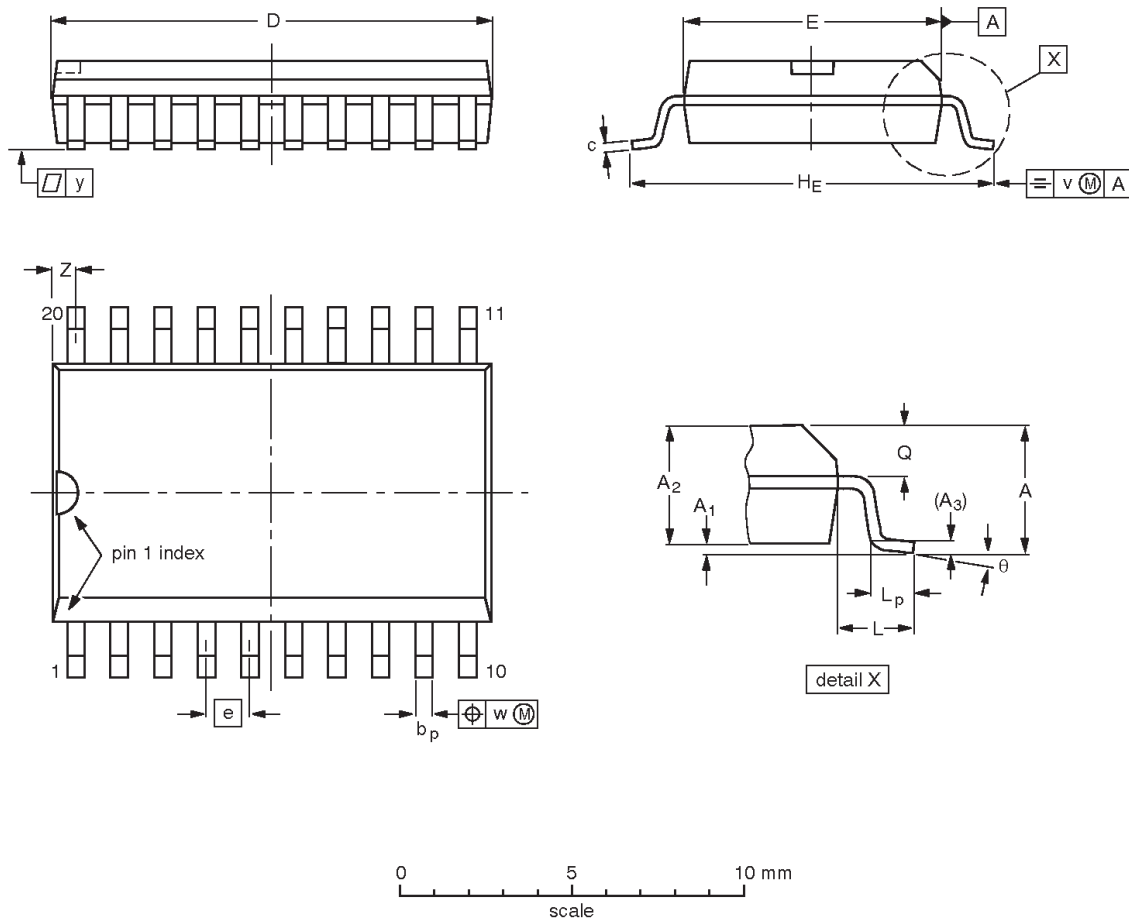
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT339-1 | | MO-150 | | | | 99-12-27 03-02-19 |

Octal bus switch with quad output enables

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SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



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 | HE | L | L _p | Q | v | w | y | Z ⁽¹⁾ | θ |
|--------|--------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm | 2.65 | 0.3 0.1 | 2.45 2.25 | 0.25 | 0.49 0.36 | 0.32 0.23 | 13.0 12.6 | 7.6 7.4 | 1.27 | 10.65 10.00 | 1.4 | 1.1 0.4 | 1.1 1.0 | 0.25 | 0.25 | 0.1 | 0.9 0.4 | 8° 0° |
| inches | 0.1 | 0.012 0.004 | 0.096 0.089 | 0.01 | 0.019 0.014 | 0.013 0.009 | 0.51 0.49 | 0.30 0.29 | 0.05 | 0.419 0.394 | 0.055 | 0.043 0.016 | 0.043 0.039 | 0.01 | 0.01 | 0.004 | 0.035 0.016 | |

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 | | | |
| SOT163-1 | 075E04 | MS-013 | | | | 99-12-27 03-02-19 |

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REVISION HISTORY

| Rev | Date | Description |
|-----|----------|-------------------------------------|
| _1 | 20040526 | Product data sheet (9397 750 13281) |

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

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

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