DATA SHEET

CBT3384

10-bit bus switch with 5-bit output enables

Philips
Semiconductors

PHILIPS

PHILIPS

10-bit bus switch with 5-bit output enables   CBT3384

FEATURES

- 5 Ω switch connection between two ports
- TTL compatible control input and output levels
- See CBTS3384 for CBT3384 with Schottky diode undershoot protection
- See CBTD3384 for CBT3384 with level shifting diodes
- Latch-up is done to JESDEC Standard JESD78 which exceeds 100 mA
- ESD classification testing is done to JESDEC Standard JESD22. Protection exceeds 2000 V to HBM per method A114 and 1000 V CDM per method C101.
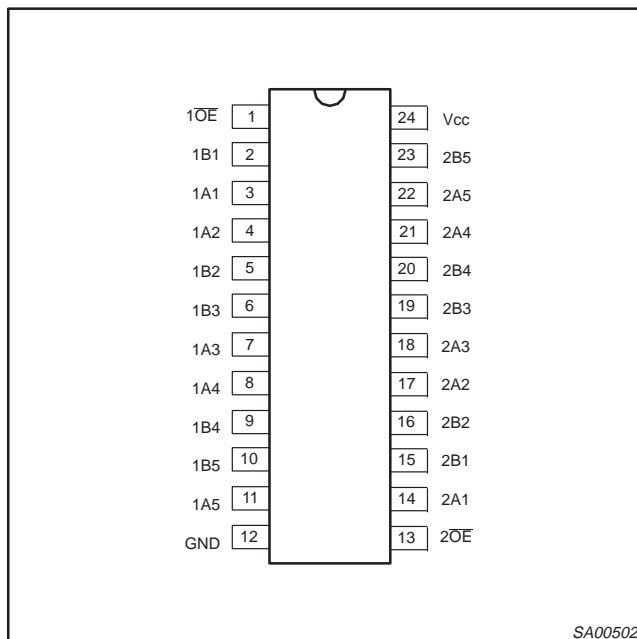
DESCRIPTION

The CBT3384 provides ten bits of high-speed TTL-compatible bus switching. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The CBT3384 device is organized as two 5-bit bus switches with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is LOW, the switch is on and port A is connected to B. When $\overline{OE}$ is HIGH, the switch is open and high-impedance state exists between the two ports.

The CBT3384 is characterized for operation from −40 to +85 °C.

PIN CONFIGURATION

1$\overline{OE}$	1		24	V$_{CC}$
1B1	2		23	2B5
1A1	3		22	2A5
1A2	4		21	2A4
1B2	5		20	2B4
1B3	6		19	2B3
1A3	7		18	2A3
1A4	8		17	2A2
1B4	9		16	2B2
1B5	10		15	2B1
1A5	11		14	2A1
GND	12		13	2$\overline{OE}$

SA00502

PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 13	1$\overline{OE}$, 2$\overline{OE}$	Output enables
3, 4, 7, 8, 11	1A1–1A5	Inputs
14, 17, 18, 21, 22	2A1–2A5	Inputs
2, 5, 6, 9, 10	1B1–1B5	Outputs
15, 16, 19, 20, 23	2B1–2B5	Outputs
12	GND	Ground (0 V)
24	V$_{CC}$	Positive supply voltage

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T$_{amb}$ = 25 °C; GND = 0 V	TYPICAL	UNIT
t$_{PLH}$ t$_{PHL}$	Propagation delay An to Yn	C$_L$ = 50 pF; V$_{CC}$ = 5 V	250	ps
C$_{IN}$	Input capacitance	V$_I$ = 0 V or V$_{CC}$	4	pF
C$_{OUT}$	Output capacitance	Outputs disabled; V$_O$ = 0 V or V$_{CC}$	10	pF
I$_{CCZ}$	Total supply current	Outputs disabled; V$_{CC}$ = 5.5 V	3	µA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
24-Pin Plastic SO	−40 to +85 °C	CBT3384D	SOT137-1
24-Pin Plastic SSOP	−40 to +85 °C	CBT3384DB	SOT340-1
24-Pin Plastic SSOP (QSOP)	−40 to +85°C	CBT3384DK	SOT556-1
24-Pin Plastic TSSOP	−40 to +85 °C	CBT3384PW	SOT355-1

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

10-bit bus switch with 5-bit output enables

CBT3384

LOGIC SYMBOL

SA00555
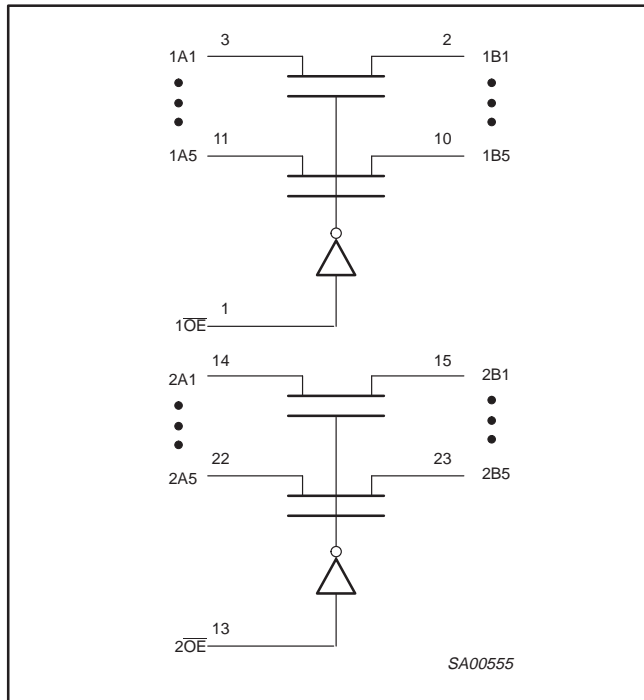
FUNCTION TABLE

INPUTS		OUTPUTS	
1$\overline{\text{OE}}$	2$\overline{\text{OE}}$	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		−50	mA
V_I	DC input voltage[3]		−1.2 to +7.0	V
I_{SW}	DC output diode current	$V_O < 0$	±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

10-bit bus switch with 5-bit output enables

CBT3384

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS T_{amb} = −40 to +85 °C			UNIT
			Min	Typ[1]	Max	
V_{IK}	Input clamp voltage	V_{CC} = 4.5 V; I_I = −18 mA	—	—	−1.2	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[2]	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 = 3.0 V or 0	—	4	—	pF
$C_{I(OFF)}$	Port off capacitance	V_O = 3.0 V or 0, $\overline{OE}$ = V_{CC}	—	10	—	pF
r_{on}[3]	On-resistance	V_{CC} = 4.5 V; V_I = 0 V; I_I = 64 mA	—	5	7	Ω
		V_{CC} = 4.5 V; V_I = 0 V; I_I = 30 mA	—	5	7	
		V_{CC} = 4.5 V; V_I = 2.4 V; I_I = −15 mA	—	10	15	
V_P	Pass voltage	V_I = V_{CC} = 5.0 V; I_O = −100 µA	3.4	3.6	3.9	V
I_{UCP}	Undershoot static current protection	V_{CC} = 5.0 V, I_B = 400 µA; $\overline{OE}$ = 5.0 V; V_B ≥ 3.0 V	—	8	—	mA

NOTES:
1. All typical values are 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.

AC CHARACTERISTICS
GND = 0 V; t_R; C_L = 50 pF

SYMBOL	PARAMETER	FROM (INPUT)	TO (OUTPUT)	LIMITS V_{CC} = +5.0 V ±0.5 V		UNIT
				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	$\overline{OE}$	A or B	1.0	5.7	ns
t_{dis}	Output disable time from High and Low level	$\overline{OE}$	A or B	1.0	5.2	ns

NOTE:
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 of 50 pF, when driven by an ideal voltage source (zero output impedance).

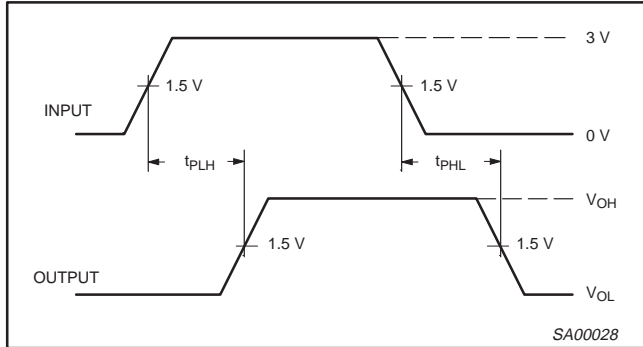| SYMBOL	PARAMETER DESCRIPTION	LIMITS T_{amb} = −40 to +85 °C V_{CC} = 5 V, ±0.5 V			UNIT
		MIN.	MEAN	MAX.	
t_{pd}	Propagation delay (see Note 1)	—	—	250	ps
t_{PZH}	Output enable time to High level	1.6	3.4	5.6	ns
t_{PHZ}	Output enable time from High level	1.7	3.3	5.5	ns
t_{PZL}	Output enable time to Low level	2.3	4	6	ns
t_{PLZ}	Output enable time from Low level	2.5	4.5	6.6	ns

NOTE:
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 of 50 pF, when driven by an ideal voltage source (zero output impedance); at +25 °C.
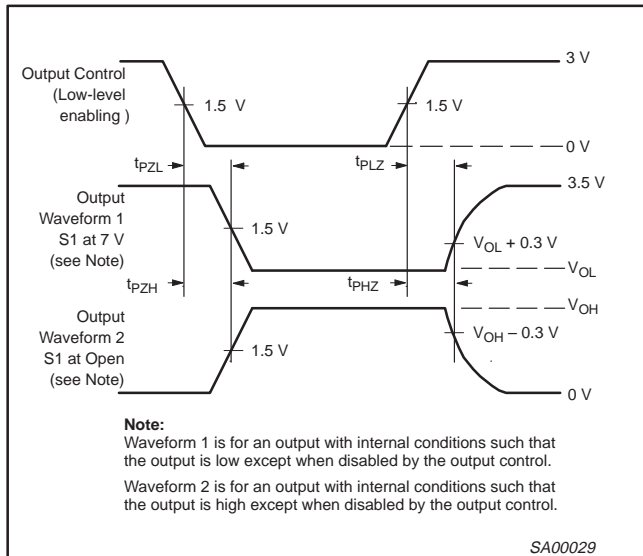
10-bit bus switch with 5-bit output enables

CBT3384

AC WAVEFORMS

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

Waveform 1. Input (An) to Output (Yn) 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

TEST CIRCUIT AND WAVEFORMS

Load Circuit

TEST	S1
t_{pd}	open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	open

DEFINITIONS

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.
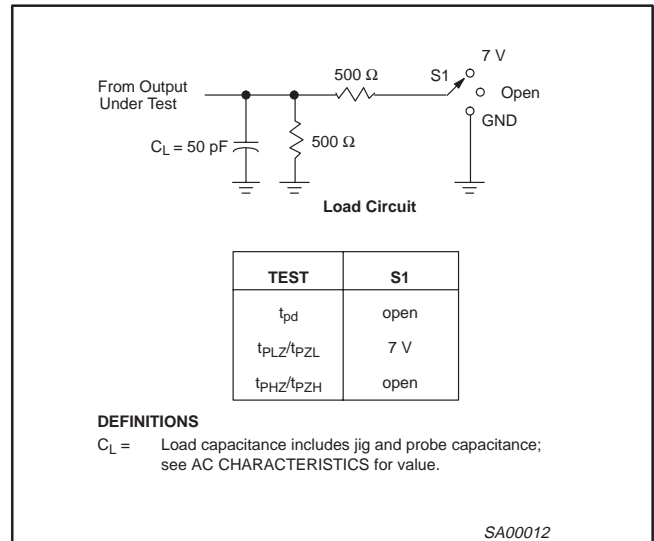
NOTES:
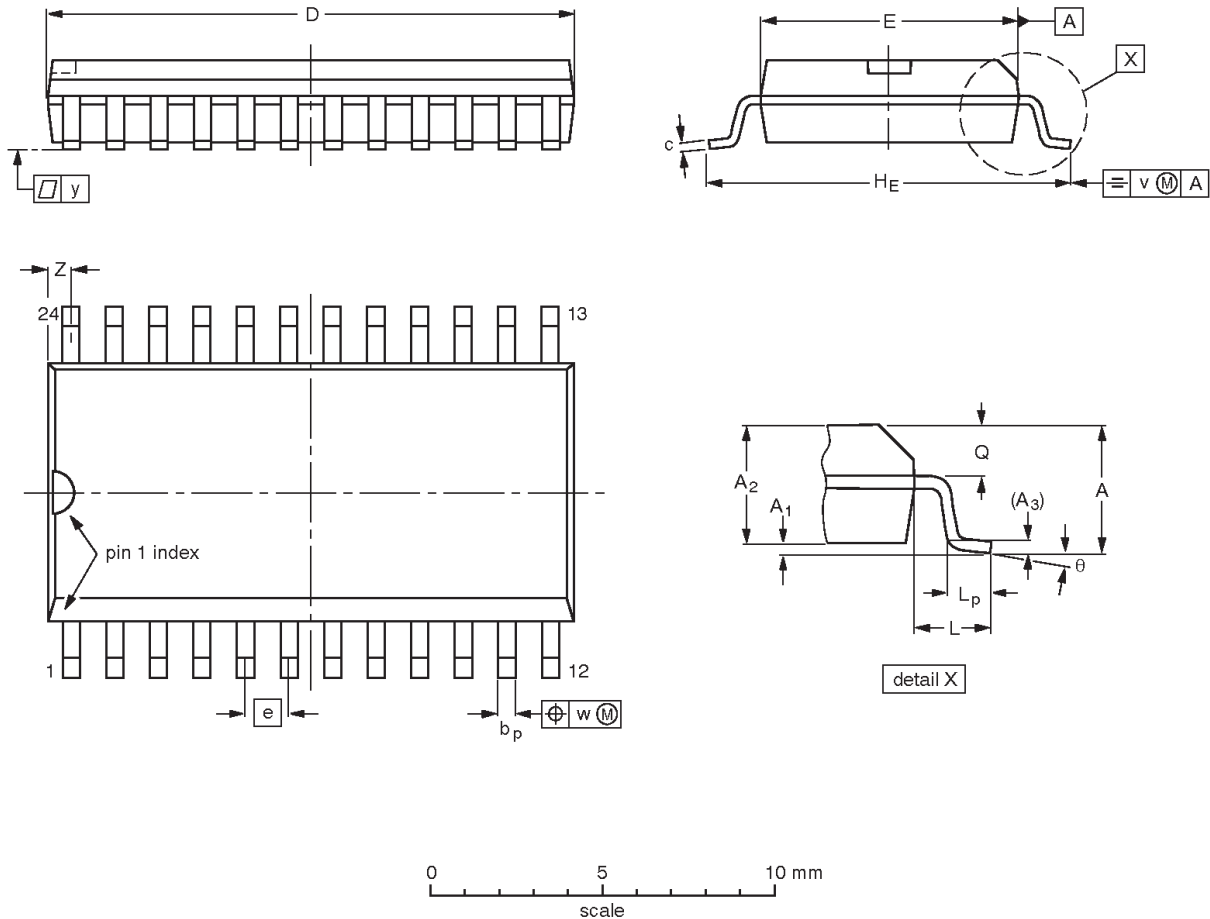1. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
2. The outputs are measured one at a time with one transition per measurement.

10-bit bus switch with 5-bit output enables   CBT3384

SO24:   plastic small outline package; 24 leads; body width 7.5 mm   **SOT137-1**

detail X

0   5   10 mm
scale

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

UNIT	A max.	A1	A2	A3	bp	c	D(1)	E(1)	e	HE	L	Lp	Q	v	w	y	Z(1)	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	15.6 15.2	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	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.61 0.60	0.30 0.29	0.050	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

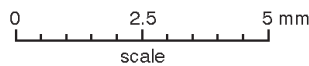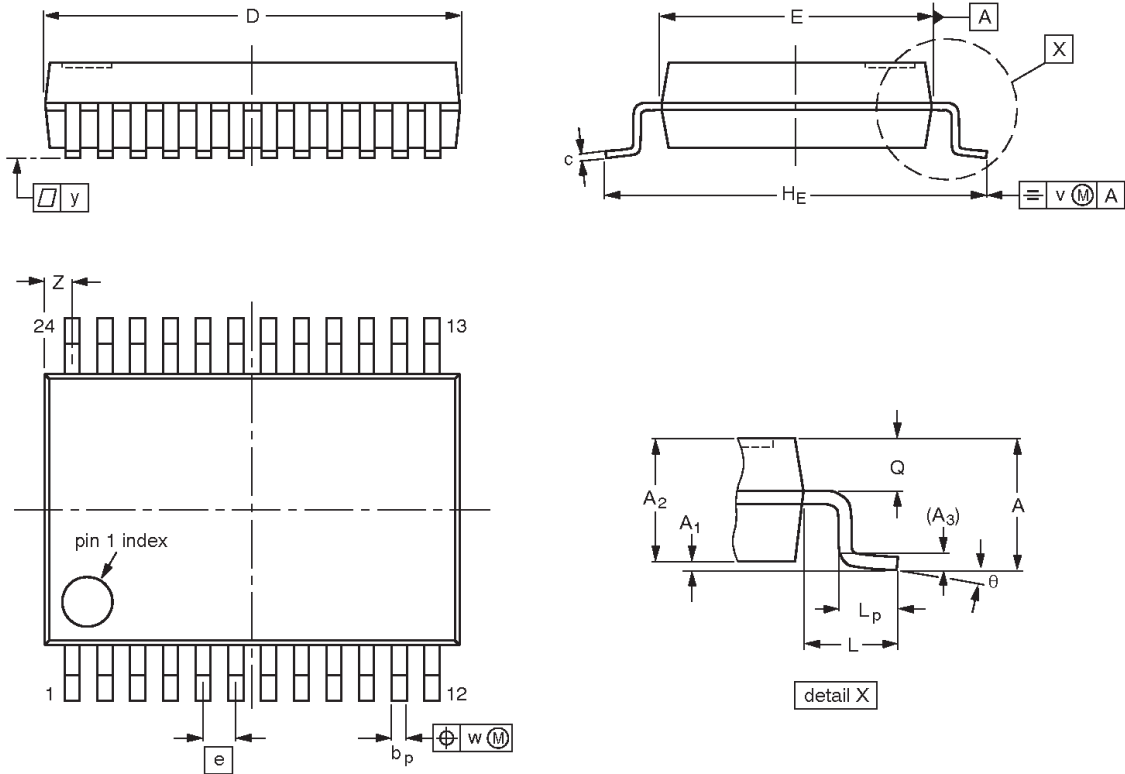1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT137-1	075E05	MS-013				~~97-05-22~~ 99-12-27

10-bit bus switch with 5-bit output enables

CBT3384

SSOP24:   plastic shrink small outline package; 24 leads; body width 5.3 mm

SOT340-1

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A1	A2	A3	bp	c	D(1)	E(1)	e	HE	L	Lp	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	8.4 8.0	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	0.8 0.4	8° 0°

Note

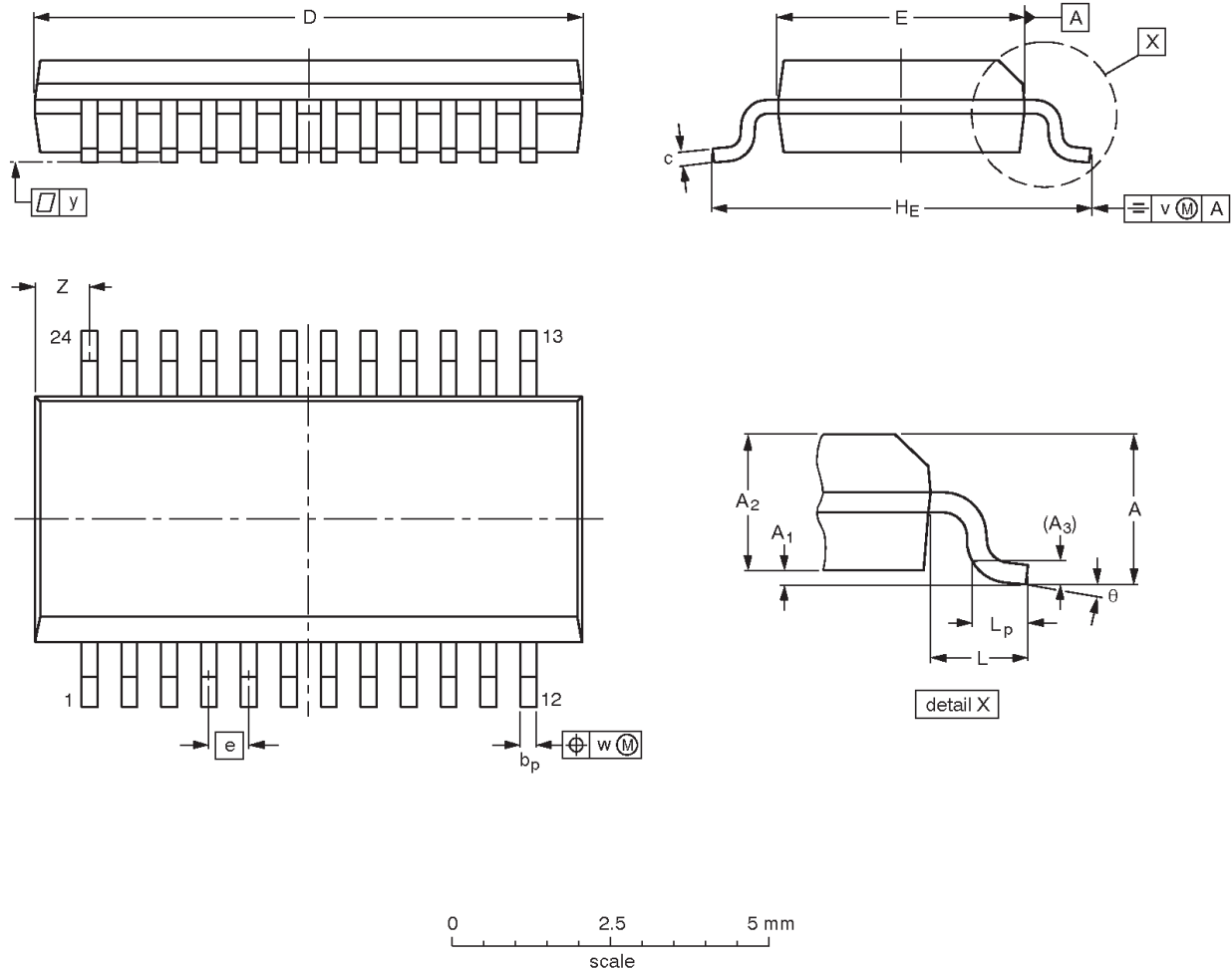1. Plastic or metal protrusions of 0.20 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT340-1		MO-150				~~95-02-04~~ 99-12-27

10-bit bus switch with 5-bit output enables

CBT3384

SSOP24:   plastic shrink small outline package; 24 leads;
body width 3.9 mm; lead pitch 0.635 mm

SOT556-1

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

UNIT	A max.	A₁	A₂	A₃	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	0.89 0.41	0.25	0.18	0.1	1.05 0.66	8° 0°
inches	0.068	0.0098 0.0040	0.061 0.055	0.010	0.012 0.008	0.0098 0.0075	0.344 0.337	0.157 0.150	0.025	0.244 0.228	0.041	0.035 0.016	0.010	0.007	0.004	0.040 0.026	8° 0°

Note

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

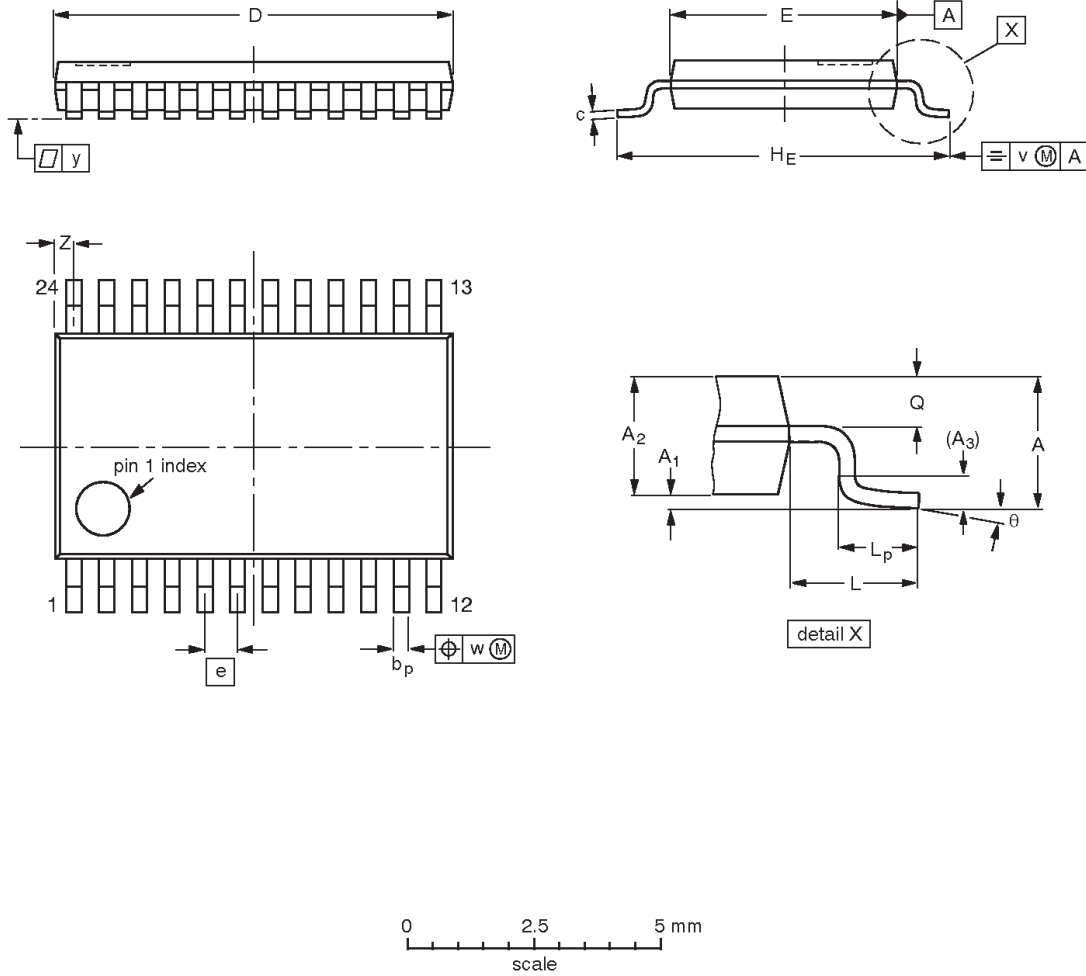| OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT556-1		MO-137				~~99-05-05~~ 99-12-27

10-bit bus switch with 5-bit output enables

CBT3384

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1

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	7.9 7.7	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	0.5 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	EIAJ			
SOT355-1		MO-153				95-02-04 99-12-27

10-bit bus switch with 5-bit output enables   CBT3384

Data sheet status

Data sheet status [1]	Product status [2]	Definitions
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.
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.
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. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A.

[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.

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, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. 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

Let's make things better.

**Philips
Semiconductors**

PHILIPS