DATA SHEET

CBT6800

10-bit bus switch with precharged outputs for live insertion

Product data

Supersedes data of 1999 Oct 28

2003 Sep 12

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10-bit bus switch with precharged outputs for live insertion

CBT6800

FEATURES

- 5 Ω switch connection between two ports
- TTL compatible input and output levels
- Outputs are precharged by bias voltage to minimize signal distortion during live insertion
- Latch-up protection exceeds 100 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 CBT6800 provides ten bits of high-speed TTL-compatible bus switching. The low on-state resistance of the switch allows bi-directional connections to be made while adding near-zero propagation delay. The device also precharges the B port to a user-selectable bias voltage (BIASV) to minimize live-insertion noise.

The CBT6800 is organized as one 10-bit switch with a single enable ($\overline{ON}$) input. When $\overline{ON}$ is low, the switch is on and port A is connected to port B. When $\overline{ON}$ is high, the switch between port A and port B is open and the B port is precharged to BIASV through the equivalent of a 10 kΩ resistor.

The CBT6800 is characterized for operation from -40 to 85 °C.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25 °C; GND = 0 V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	C_L = 50 pF; V_{CC} = 5 V	250	ps
C_{IN}	Input capacitance - control pin	V_I = 0 V or V_{CC}	3.5	pF
C_{OUT}	Output capacitance - I/O pins	Outputs disabled; V_O = 0 V or V_{CC}	8.2	pF
I_{CCZ}	Total supply current	Outputs disabled; V_{CC} =5.5 V	1	μA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
24-Pin Plastic TSSOP	-40 to +85 °C	CBT6800PW	SOT355-1

PIN CONFIGURATION

SA00505
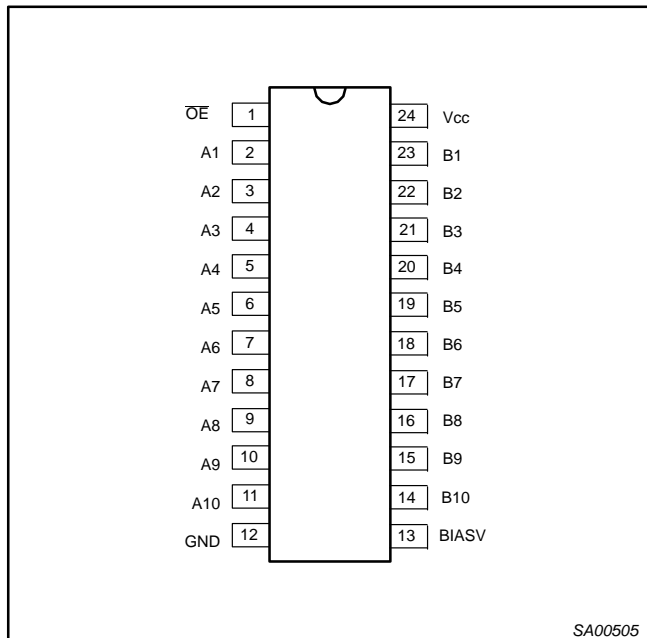
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1	$\overline{OE}$	Output enable
13	BIASV	Precharge bias voltage input
2, 3, 4, 5, 6, 7, 8, 9, 10, 11	A1-A10	A-port I/O pins
23, 22, 21, 20, 19, 18, 17, 16, 15, 14	B1-B10	B-port I/O pins - with active pullup
12	GND	Ground (V)
24	V_{CC}	Positive supply voltage

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LOGIC SYMBOL

SA00536
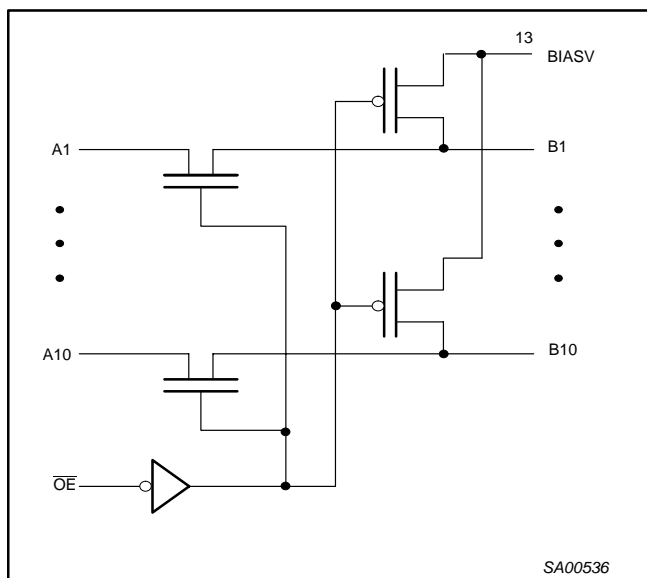
FUNCTION TABLE

$\overline{OE}$	B1 - B10	FUNCTION
L	A1 - A10	Connect
H	BIASV	Precharge

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 clamp diode current	$V_O < 0$	-50	mA
T_{stg}	Storage temperature range		-65 to 150	°C
BiasV	DC voltage range		-0.5 to 6.0	V

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
BIASV	DC supply voltage	1.3	V_{CC}	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 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 - $\overline{OE}$	V_{CC} = 5.5 V; V_I = GND or 5.5 V	—	—	±5	μA
I_O	Output bias current	V_{CC} = 4.5 V; BiasV = 2.4 V; V_O = 0	0.25	—	—	mA
I_{CC}	Quiescent supply current	V_{CC} = 5.5 V; I_O = 0, V_I = V_{CC} or GND	—	—	50	μA
ΔI_{CC}	Control pins[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	—	3.5	—	pF
$C_{O(OFF)}$	Off-state capacitance - I/O pins	V_O = 3 V or 0; switch off	—	8.2	—	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	
VP	Pass gate voltage	V_{IN} = V_{CC} = 5.0 V, I_{OUT} = -100 μA	3.4	3.6	3.9	V

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.

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AC CHARACTERISTICS

GND = 0 V; C_L = 50 pF; $t_r = t_f \leq 2.5$ ns

| 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_{PZH} T_{PZL}	BIASV = GND BIASV = 3 V	$\overline{ON}$	A or B	2.4 3.0	7.7 8.3	ns
t_{PHZ} T_{PLZ}	BIASV = GND BIASV = 3 V	$\overline{ON}$	A or B	1.0 3.1	5.3 7.8	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).

AC WAVEFORMS

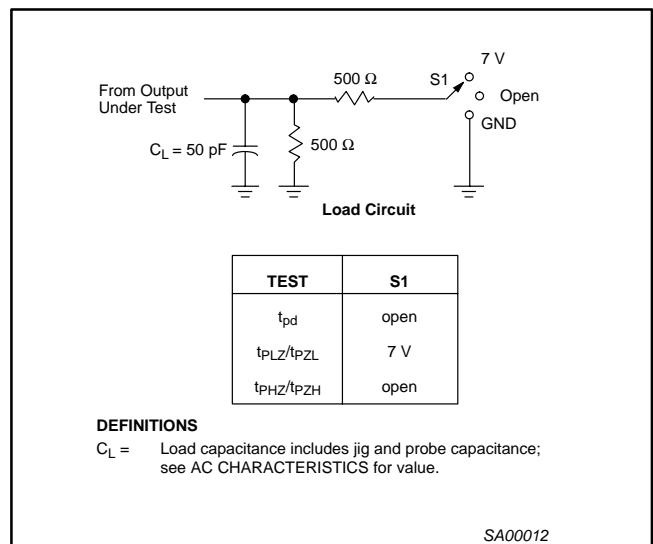V_M = 1.5 V, V_{IN} = GND to 3.0 V
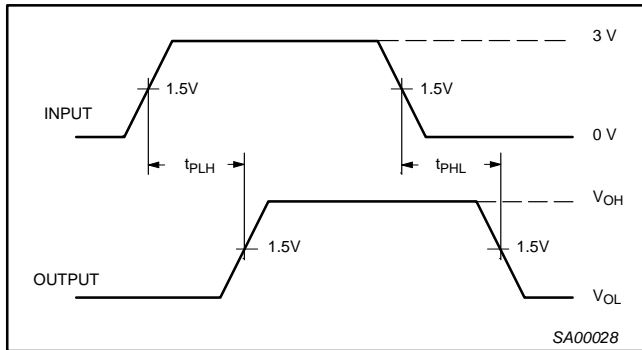
Waveform 1. Waveforms Showing the Input (An) to Output (Yn) Propagation Delays
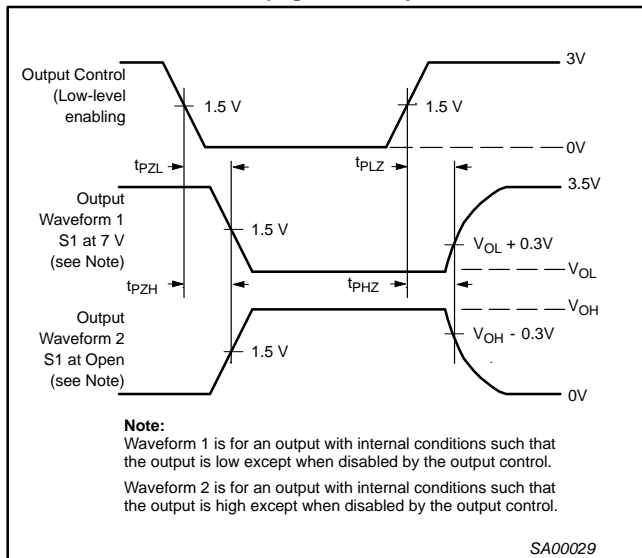
Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS

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, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
2. The outputs are measured one at a time with one transition per measurement.

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TSSOP24:   plastic thin shrink small outline package; 24 leads; body width 4.4 mm   **SOT355-1**
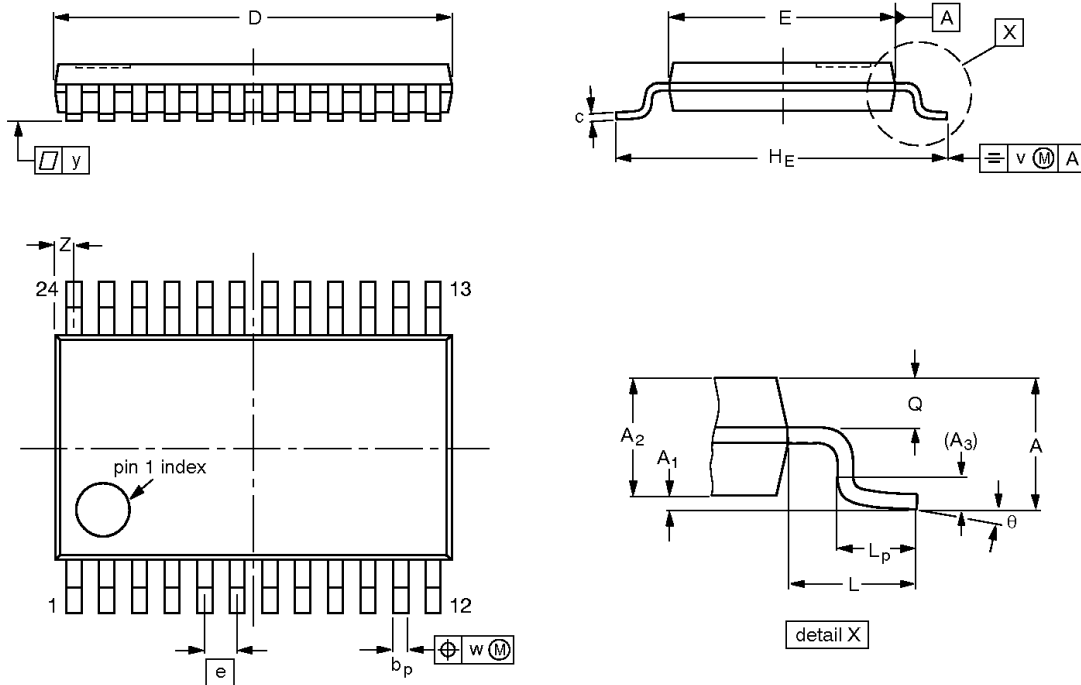
DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	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	7.9 7.7	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			
SOT355-1		MO-153				~~99-12-27~~ 03-02-19

REVISION HISTORY

Rev	Date	Description
_2	20030912	**Product data (9397 750 12059); ECN 853-2182 30126 dated 18 July 2003. Supersedes data of 28 October 1999 (9397 750 06552).** Modifications: • Corrections to block diagram drawing
_1	19991028	Product data (9397 750 06552); ECN: 853-2182 22598 of 28 October 1999

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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

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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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