DATA SHEET

CBT6810

10-bit bus switch with precharged outputs and Schottky undershoot protection for live insertion

Product specification
Supersedes data of 1999 Apr 05

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Philips
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10-bit bus switch with precharged outputs and Schottky undershoot protection for live insertion

CBT6810

FEATURES

- 5Ω switch connection between port A and port B
- TTL compatible input and output levels
- Undershoot protection included to prevent shoot through level changes
- Bias voltage pre-charges the outputs to minimize signal distortion during live insertion
- 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 CBT6810 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 CBT6810 is organized as one 10-bit switch with a single enable ($\overline{OE}$) input. When $\overline{OE}$ is low, the switch is on and port A is connected to port B. When $\overline{OE}$ 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 CBT6810 is characterized for operation from –40°C to +85°C.

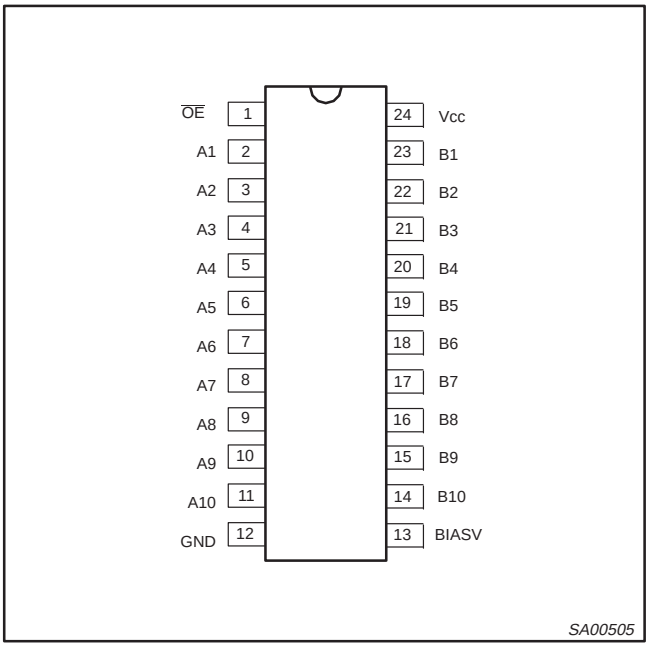
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	C_L = 50pF; V_{CC} = 5V	250	ps
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	3.5	pF
C_{IO}	Input/output capacitance	Outputs disabled; V_O = 0V or V_{CC}	9.0	pF

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
24-Pin Plastic TSSOP Type I	–40°C to +85°C	CBT6810 PW DH	SOT355–1

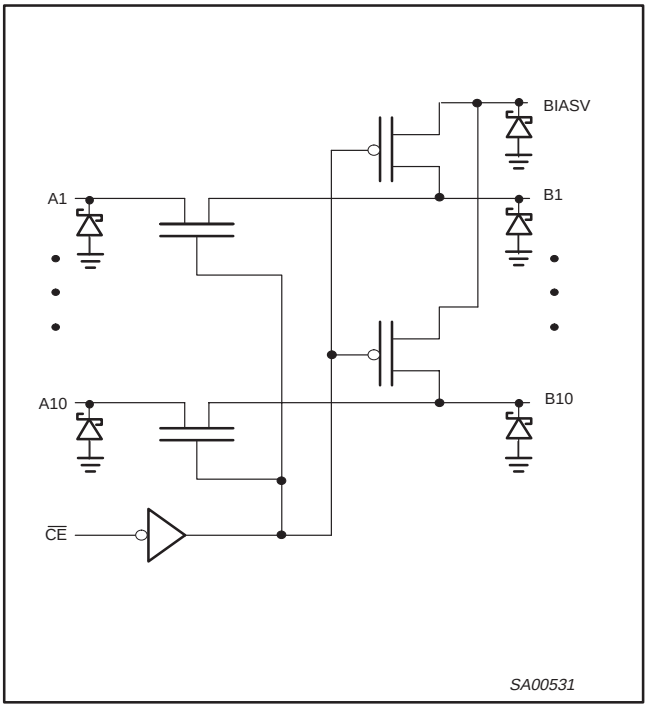
PIN CONFIGURATION



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 side
23, 22, 21, 20, 19, 18, 17, 16, 15, 14	B1–B10	B - port side with active pullup
12	GND	Ground (V)
24	V_{CC}	Positive supply voltage

LOGIC SYMBOL



FUNCTION TABLE

$\overline{OE}$	STATE
L	A port = B port
H	A port = Z
H	B port = BIASV

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 clamp diode current		–50	mA
V_I	DC input voltage[3]		–0.5 to +7.0	V
I_{SW}	DC continuous channel current		± 128	mA
T_{stg}	Storage temperature range		–65 to 150	°C
BIASV	DC Bias voltage range		–0.5 to 7.0	V
Θ_{JA}	Power dissipation per package Plastic thin shrink small outline package		134	°C/W

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	4.0	5.5	V
BIASV	DC supply voltage	1.3	V_{CC}	V
V_{IH}	High-level input voltage (control pin)	2.0		V
V_{IL}	Low-level Input voltage (control pin)		0.8	V
T_{amb}	Operating free-air temperature range	–40	+85	°C

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			T_{amb} = –40°C to +85°C			
			Min	Typ[1]	Max	
V_{IK}	Input clamp voltage	V_{CC} = 4.5 V; I_I = –18mA			–1.2	V
I_I	Input leakage current (control pin)	V_{CC} = 5.5 V; V_I = GND or 5.5V			±5	µA
I_O	Output bias current (B pins)	V_{CC} = 4.5 V; BiasV = 2.4 V; V_O = 0, $\overline{OE}$ = V_{CC}			–0.25	mA
I_{CC}	Quiescent supply current	V_{CC} = 5.5 V; I_O = 0, V_I = V_{CC} or GND			2.5	mA
ΔI_{CC}	Control pins[2]	V_{CC} = 5.5 V, one input at 3.4V, other inputs at V_{CC} or GND			2.5	mA
C_I	Control pins	V_I= 3 V or 0		3.5		pF
$C_{O(OFF)}$	Terminal capacitance	V_O = 3 V or 0; switch off		9.0		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_{IN} = V_{CC} = 5.0 V; I_{out} = –100 µA	3.4	3.6	3.9	V
I_{USP}[4]	Undershoot static current protection	V_{CC} = 5.0 V, BiasV = V_{CC} I_B = –5 µA, $V_B \geq$ 3 V		–10		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.
4. Force I_{USP}, measure $V_B \geq$ 3 V

AC CHARACTERISTICS FOR V_{CC} = 5.0V ±0.5V RANGE

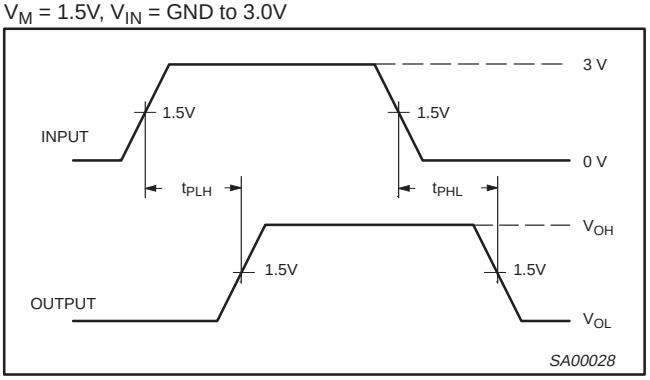
GND = 0V; $t_r = t_f \leq 2.5$ns; C_L = 50pF.

SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			T_{amb} = –40 to +85°C			
			MIN	TYP[1]	MAX	
t_{pd}	Propagation delay An to Bn; Bn to An[2]	1			0.25	ns
t_{PZH}	3-State output enable time OE to An; OE to Bn; BIASV = GND	2	1.8	3.5	5.3	ns
t_{PZL}	3-State output enable time OE to An; OE to Bn; BIASV = 3.0V	2	2.1	4.2	7.2	ns
t_{PHZ}	3-State output enable time $\overline{OE}$ to An; $\overline{OE}$ to Bn; BIASV = GND	2	1.7	3.7	6.1	ns
t_{PLZ}	3-State output enable time $\overline{OE}$ to An; $\overline{OE}$ to Bn; BIASV = 3.0V	2	1.0	5.5	7.3	ns

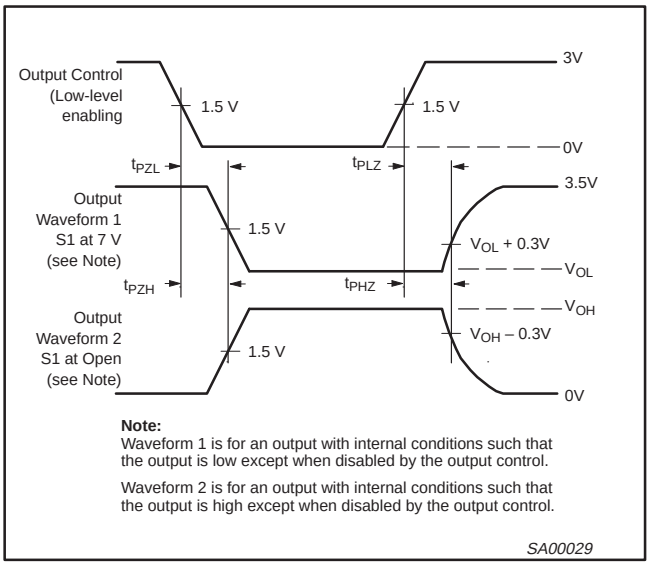
NOTE:
1. All typical values are measured at T_{amb} = 25°C and V_{CC} = 5.0V
2. Warranted but not production tested. The propagation delay is based on the RC time constant of the typical ON-state resistance of the switch and a load capacitance of 50pF, when driven by an ideal voltage source (zero output impedance)

AC WAVEFORMS

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

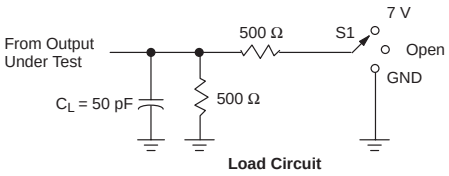


Waveform 1. Waveforms Showing the Input (An) to Output (Yn) Propagation Delays



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.

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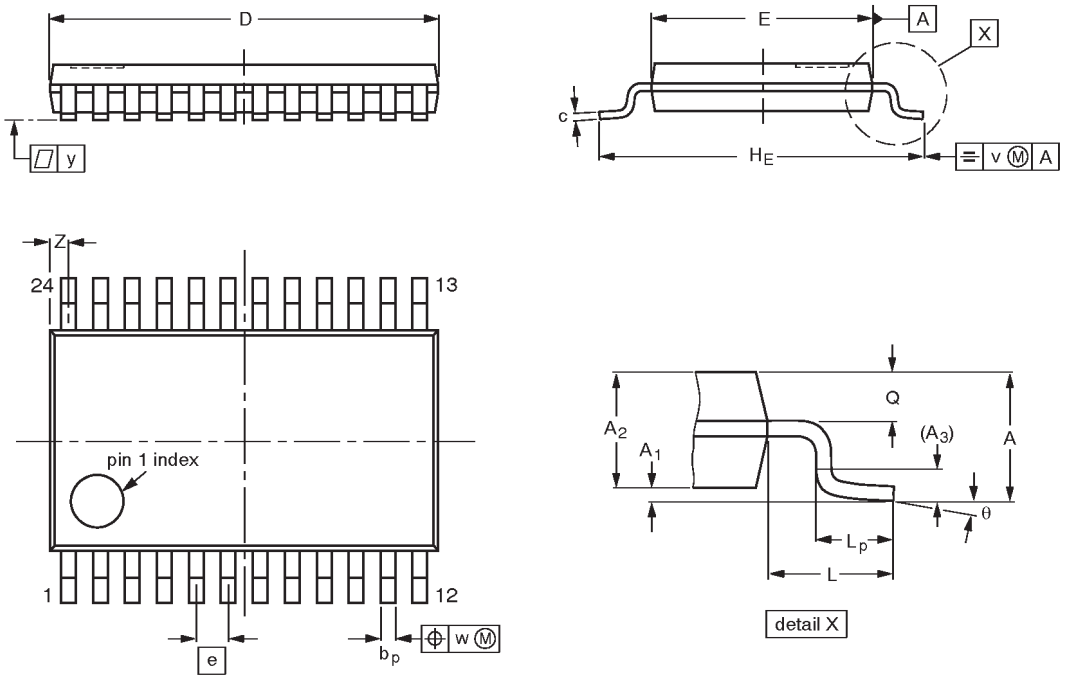
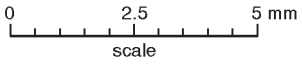
NOTES:
1. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
2. The outputs are measured one at a time with one transition per measurement.

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-153AD				~~93-06-16~~ 95-02-04

NOTES

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Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1] Please consult the most recently issued datasheet before initiating or completing a design.

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 134). 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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