

# DATA SHEET

## **CBT16292**

12-bit 1-of-2 multiplexer/demultiplexer  
with internal pulldown resistors

Product specification

1999 Sep 13

# 12-bit 1-of-2 multiplexer/demultiplexer with internal pulldown resistors

## CBT16292

### FEATURES

- 6  $\Omega$  switch connection between two ports
- TTL compatible control input levels
- Break-before-make feature
- Internal 500  $\Omega$  pulldown resistors to ground
- 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 CBT16292 is a 12-bit 1-of-2 high-speed TTL-compatible multiplexer/demultiplexer. The low on-state resistance of the switch of the switch allows connections to be made with minimal propagation delay.

When the select (S) input is low, port A is connected to port B1 and  $R_{INT}$  is connected to port B2. When S is high, port A is connected to port B2 and  $R_{INT}$  is connected to port B1.

The CBT16292 is characterized for operation from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

### PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
3, 5, 7, 10, 12, 14, 16, 20, 22, 24, 26, 28, 55, 56	NC	No internal connection
2, 4, 6, 9, 11, 13, 15, 18, 21, 23, 25, 27	1A-12A	Inputs
54, 53	1B1, 1B2	Outputs
52, 51	2B1, 2B2	Outputs
50, 48	3B1, 3B2	Outputs
49, 48	4B1, 4B2	Outputs
45, 44	5B1, 5B2	Outputs
43, 42	6B1, 6B2	Outputs
41, 40	7B1, 7B2	Outputs
39, 37	8B1, 8B2	Outputs
36, 35	9B1, 9B2	Outputs
34, 33	10B1, 10B2	Outputs
32, 31	11B1, 11B2	Outputs
30, 29	12B1, 12B2	Outputs
8, 19, 38, 49	GND	Ground (0V)
17	$V_{CC}$	Positive supply voltage

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}$	TYPICAL	UNIT
$t_{PLH}$ $t_{PHL}$	Propagation delay nA to nBx	$C_L = 50 \text{ pF}; V_{CC} = 5 \text{ V}$	0.25	ns
$C_{IN}$	Input capacitance – control	$V_I = 0 \text{ V or } V_{CC}$	4	pF
$C_{OUT}$	Output capacitance	Outputs disabled; $V_{CC} = 0 \text{ V}; V_O = 3 \text{ V or } 0 \text{ V}$	6	pF

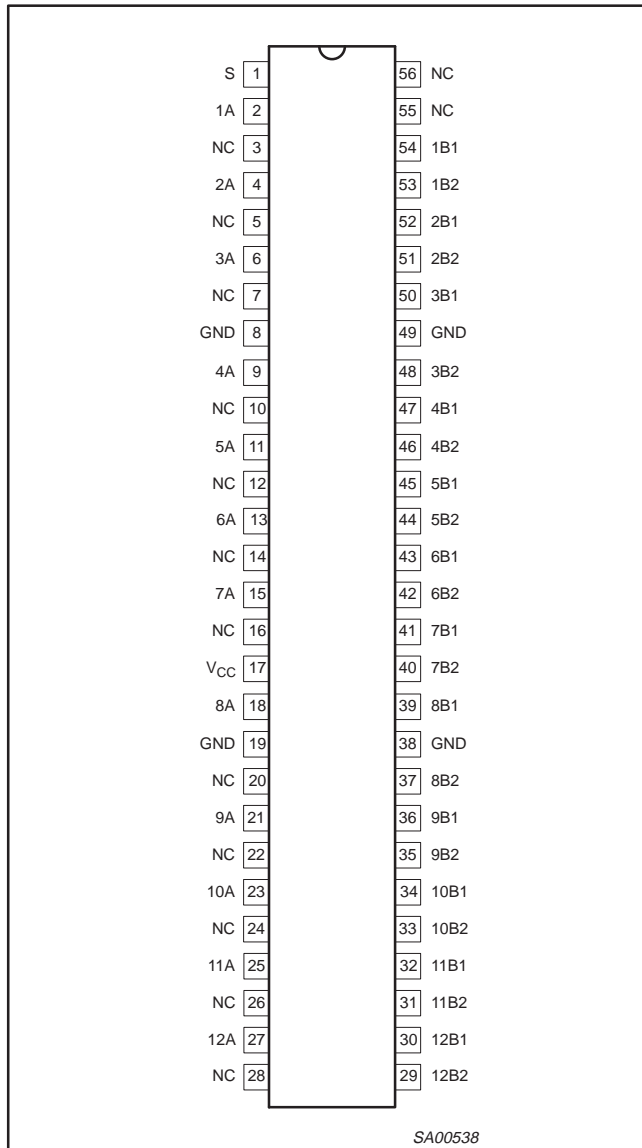
### ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
56-Pin Plastic TSSOP Type II	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	CBT16292 DGG	SOT364-1

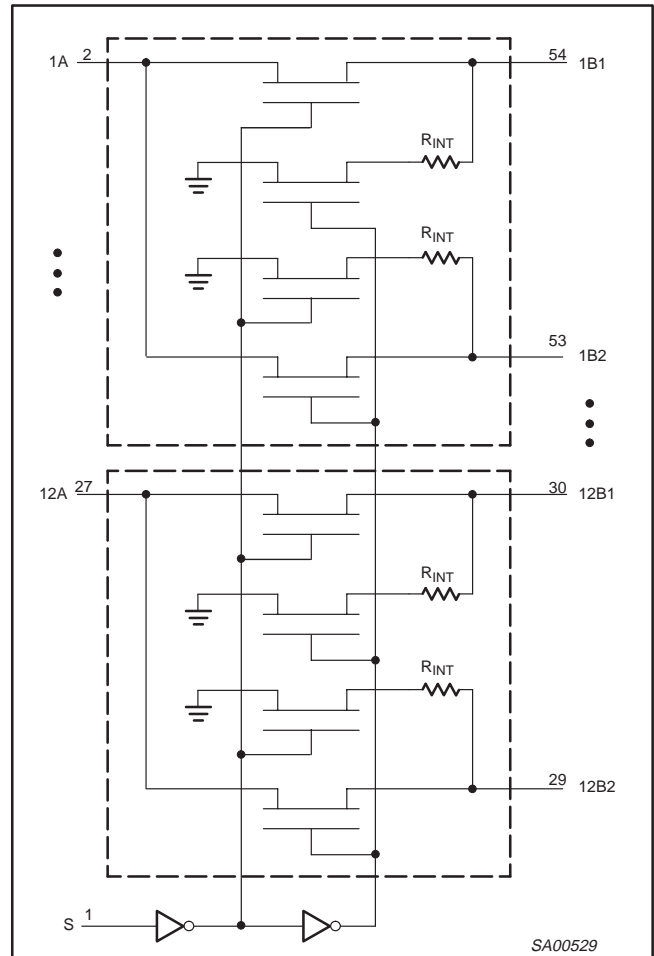
# 12-bit 1-of-2 multiplexer/demultiplexer with internal pulldown resistors

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## PIN CONFIGURATION



## LOGIC SYMBOL



## FUNCTION TABLE

INPUT S	FUNCTION
L	A port = B1 port R <sub>INT</sub> = B2 port
H	A port = B2 port R <sub>INT</sub> = B1 port

H = High voltage level  
L = Low voltage level

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## ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
$V_{CC}$	DC supply voltage		-0.5 to +7.0	V
$I_{IK}$	DC input diode current	$V_I < 0$	-50	mA
$V_I$	DC input voltage <sup>3</sup>		-0.5 to +7.0	V
$I_{SW}$	DC continuous channel current	$V_O = 0\text{ V to }V_{CC}$	$\pm 128$	mA
$T_{stg}$	Storage temperature range		-65 to 150	°C
$\theta_{jA}$	Plastic thin shrink small outline package (TSSOP)		97	°C/W

### 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 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.
- 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
$V_{IH}$	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

## DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			$T_{amb} = -40^\circ\text{C to }+85^\circ\text{C}$			
			Min	Typ <sup>1</sup>	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	$V_{CC} = 5.5\text{ V}; V_I = \text{GND or }V_{CC}$			$\pm 5$	$\mu\text{A}$
$I_{CC}$	Quiescent supply current	$V_{CC} = 5.5\text{ V}; I_O = 0, V_I = V_{CC}\text{ or GND}$			3	$\mu\text{A}$
$\Delta I_{CC}$	Additional supply current per control input pin <sup>2</sup>	$V_{CC} = 5.5\text{ V}$ , 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		pF
$C_{IO(OFF)}$	Power-off leakage current	$V_O = 3\text{ V or }0, V_{CC} = 0\text{ V}$		6		pF
$r_{on}^3$		$V_{CC} = 4.5\text{ V}; V_I = 0\text{ V}; I_I = 64\text{ mA}$		8	12.5	$\Omega$
		$V_{CC} = 4.5\text{ V}; V_I = 0\text{ V}; I_I = 30\text{ mA}$		8	11	$\Omega$
		$V_{CC} = 4.5\text{ V}; V_I = 2.4\text{ V}; I_I = -15\text{ mA}$		13	16	$\Omega$

### NOTES:

- All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_{amb} = 25^\circ\text{C}$
- 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

$V_{CC} = 5.0V \pm 0.5V$ ;  $GND = 0V$ ;  $t_R = t_F \leq 2.5\text{ ns}$ ;  $C_L = 50\text{ pF}$

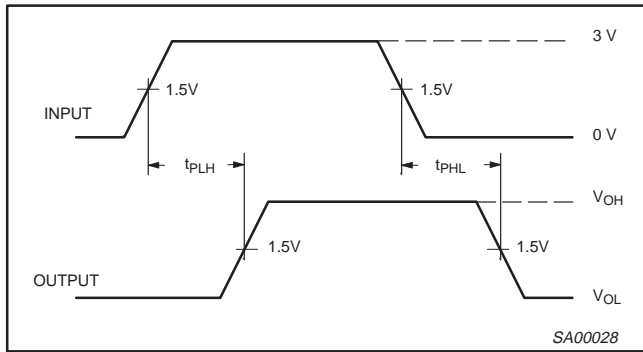
SYMBOL	PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5.0V \pm 0.5V$		UNIT
				Min	Max	
$t_{pd}$	Propagation delay <sup>1</sup>	A or B	B or A		0.4	ns
$t_{en}$	Output enable time to High and Low level	S	A or B	1.5	5.8	ns
$t_{dis}$	Output disable time from High and Low level	S	A or B	1.5	4.5	ns
$t_{bbm2}$	Break-before-make time	A	nB1 or nB2	0	2	ns

**NOTE:**

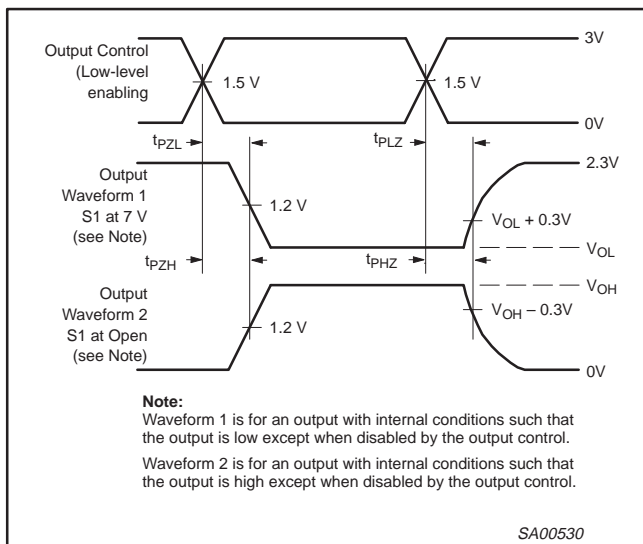
1. This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical on-state resistance of the switch and a load capacitance of 50 pF, when driven by an ideal voltage source (zero output impedance).
2. Time interval between break and make measured at the same operating point ( $V_{CC}$  and temperature).

## AC WAVEFORMS

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



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

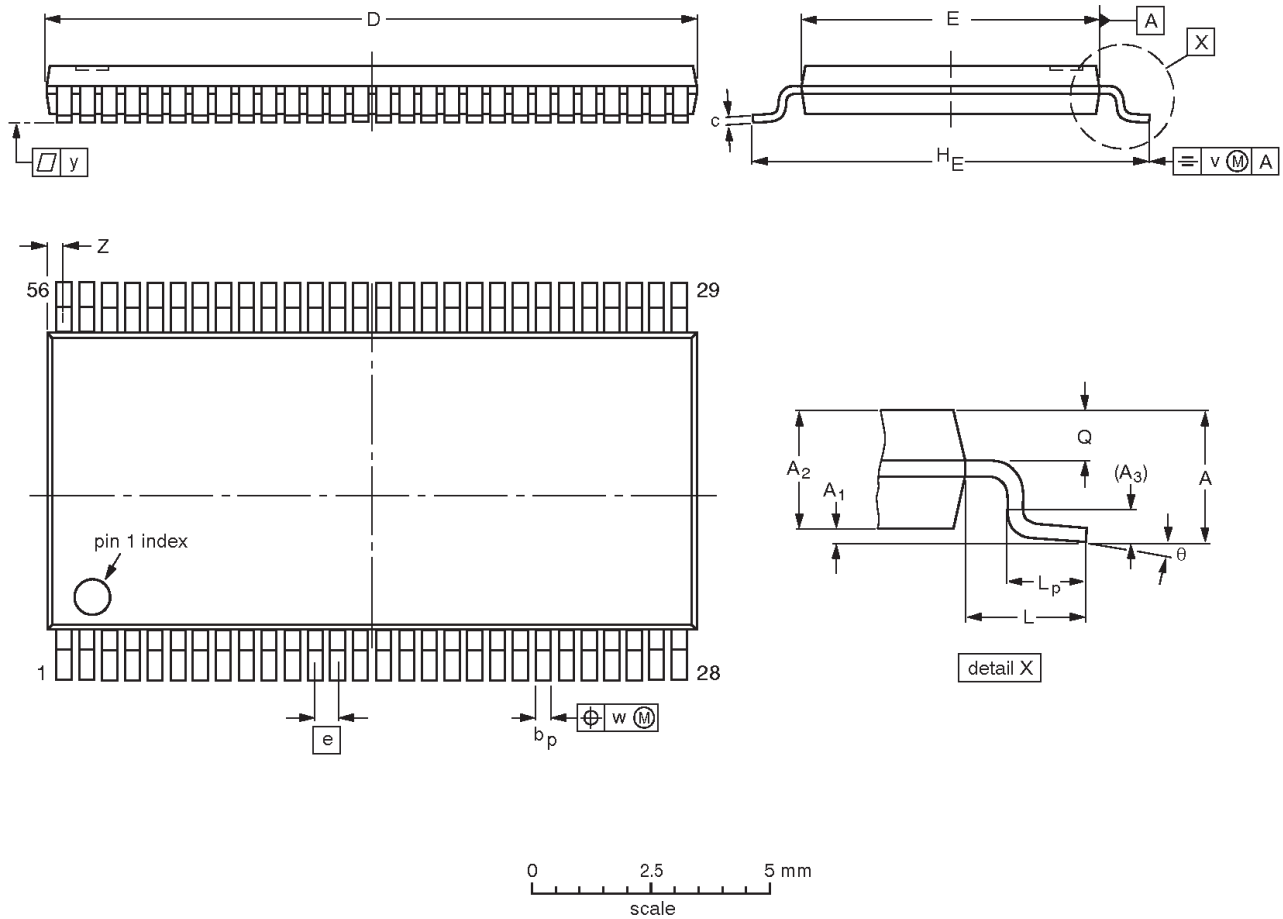
**DEFINITIONS**  
 $C_L =$  Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

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TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1mm

SOT364-1



**DIMENSIONS (mm are the original dimensions).**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z	θ
mm	1.2	0.15 0.05	1.05 0.85	0.25	0.28 0.17	0.2 0.1	14.1 13.9	6.2 6.0	0.5	8.3 7.9	1.0	0.8 0.4	0.50 0.35	0.25	0.08	0.1	0.5 0.1	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			
SOT364-1		MO-153EE				93-02-03 95-02-10

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

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**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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