**Product data sheet** 

### 1. General description

The CBT3126 is a quad FET bus switch with independent line switches. Each switch is disabled when the associated Output Enable (OE) input is LOW.

The CBT3126 is characterized for operation from -40 °C to +85 °C.

### 2. Features

- Standard '126-type pinout
- Multiple package options
- **5**  $\Omega$  switch connection between two ports
- TTL-compatible input levels
- Minimal propagation delay through the switch
- Latch-up protection exceeds 500 mA per JEDEC standard JESD78 class II level A
- ESD protection:
  - HBM JESD22-A114E exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101C exceeds 1000 V
- Specified from –40 °C to +85 °C

### 3. Ordering information

Table 1. Ordering information							
Type number	Temperature range	Package	Package				
		Name	Description	Version			
CBT3126D	–40 °C to +85 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1			
CBT3126DB	–40 °C to +85 °C	SSOP14	plastic shrink small outline package; 14 leads; body width 5.3 mm	SOT337-1			
CBT3126PW	–40 °C to +85 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1			
CBT3126DS	–40 °C to +85 °C	SSOP16 <sup>[1]</sup>	plastic shrink small outline package; 16 leads; body width 3.9 mm; lead pitch 0.635 mm	SOT519-1			

[1] Also known as QSOP16.



CBT3126 Quad FET bus switch

# 4. Functional diagram



# 5. Pinning information



### 5.1 Pinning

### 5.2 Pin description

Table 2.     Pin description						
Symbol	Symbol Pin					
	SOT108-1 SOT337-1 and SOT402-1	SOT519-1				
10E to 40E	1, 4, 10, 13	2, 5, 12, 15	output enable input			
1A to 4A,	2, 5, 9, 12	3, 6, 11, 14	A input/output			
1B to 4B	3, 6, 8, 11	4, 7, 10, 13	B output/input			

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**Quad FET bus switch** 

Table 2.         Pin description continued						
Symbol	Pin		Description			
	SOT108-1 SOT337-1 and SOT402-1	SOT519-1				
GND	7	8	ground (0 V)			
V <sub>CC</sub>	14	16	positive supply voltage			
n.c.	-	1, 9	not connected			

# 6. Functional description

#### Table 3. Function selection

*H* = *HIGH* voltage level; *L* = *LOW* voltage level.

	Switch
nOE	
L	nA to nB disconnected
H	nA to nB connected

### 7. Limiting values

#### Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		-0.5	+7.0	V
VI	input voltage		<u>[1]</u> –0.5	+7.0	V
I <sub>SW</sub>	switch current	continuous current through each switch	-	128	mA
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-50	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40 \ ^{\circ}C \ to \ +125 \ ^{\circ}C$	[2]		
		SO14 package	<u>[3]</u>	500	mW
		SSOP14 and SSOP16 package	<u>[4]</u> _	500	mW
		TSSOP14 package	<u>[4]</u> _	500	mW

[1] The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

[2] The package thermal impedance is calculated from JESD51-7.

[3] For SO14 package;  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[4] For SSOP14, SSOP16 and TSSOP14 packages; Ptot derates linearly with 5.5 mW/K above 70 °C.

# 8. Recommended operating conditions

#### Table 5. Operating conditions

All unused control inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		4.5	5.5	V
V <sub>IH</sub>	HIGH-level input voltage		2.0	-	V
V <sub>IL</sub>	LOW-level input voltage		-	0.8	V
T <sub>amb</sub>	ambient temperature	operating in free-air	-40	+85	°C

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# 9. Static characteristics

#### Table 6. Static characteristics

 $T_{amb} = -40 \circ C$  to +85  $\circ C$ .

anno						
Symbol	Parameter	Conditions	Min	Typ <mark>[1]</mark>	Max	Unit
VIK	input clamping voltage	$V_{CC}$ = 4.5 V; I <sub>I</sub> = -18 mA	-	-	-1.2	V
V <sub>pass</sub>	pass voltage	$V_{I}$ = $V_{CC}$ = 5.0 V; $I_{SW}$ = $-100~\mu A$	-	3.8	-	V
I	input leakage current	$V_{CC}$ = 5.5 V; $V_{\rm I}$ = GND or 5.5 V	-	-	±1	μΑ
I <sub>CC</sub>	supply current	$V_{CC}$ = 5.5 V; $I_{SW}$ = 0 mA; $V_I$ = $V_{CC}$ or GND	-	-	3	μΑ
$\Delta I_{CC}$	additional supply current	control pins; per input; $V_{CC} = 5.5 V$ ; one input at 3.4 V, other inputs at $V_{CC}$ or GND	[2] -	-	2.5	mA
CI	input capacitance	control pins; $V_1 = 3 V \text{ or } 0 V$	-	1.7	-	pF
C <sub>io(off)</sub>	off-state input/output capacitance	$V_O = 3 V \text{ or } 0 V; nOE = V_{CC}$	-	3.4	-	pF
R <sub>ON</sub>	ON resistance	$V_{CC} = 4.0 V$	[3]			
		V <sub>I</sub> = 2.4 V; I <sub>I</sub> = 15 mA	-	16	22	Ω
		$V_{CC} = 4.5 V$				
		$V_{I} = 0 V; I_{I} = 64 mA$	-	5	7	Ω
		$V_{I} = 0 V; I_{I} = 30 mA$	-	5	7	Ω
		$V_{I} = 2.4 \text{ V}; I_{I} = 15 \text{ mA}$	-	10	15	Ω

[1] All typical values are measured at V<sub>CC</sub> = 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<sub>CC</sub> or GND.

[3] Measured by the voltage drop between the A and the B terminals at the indicated current through the switch. ON resistance is determined by the lowest voltage of the two (A or B) terminals.

### **10. Dynamic characteristics**

#### Table 7. Dynamic characteristics

 $T_{amb} = -40 \degree C$  to +85 °C;  $V_{CC} = 4.5 V$  to 5.5 V; for test circuit see Figure 8.

Symbol	Parameter	Conditions	Min	Max	Unit
t <sub>pd</sub>	propagation delay	nA to nB or nB to nA; see Figure 6	[1][2]	0.25	ns
t <sub>en</sub>	enable time	nOE to nA or nB; see Figure 7	<sup>[2]</sup> 1.6	4.5	ns
t <sub>dis</sub>	disable time	nOE to nA or nB; see Figure 7	<u>[2]</u> 1.0	5.4	ns

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

# **11. AC waveforms**



Measurement points are given in Table 8.

 $V_{\mbox{OL}}$  and  $V_{\mbox{OH}}$  are typical voltage output levels that occur with the output load.

#### Fig 7. Enable and disable times

#### Table 8.Measurement points

Input	Output		
V <sub>M</sub>	V <sub>M</sub>	V <sub>X</sub>	V <sub>Y</sub>
1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> – 0.3 V

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# **12. Test information**



### Table 9. Test data

Supply voltage	y voltage Input		Load		V <sub>EXT</sub>		
V <sub>CC</sub>	VI	t <sub>r</sub> , t <sub>f</sub>	CL	RL	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PLZ</sub> , t <sub>PZL</sub>	t <sub>PHZ</sub> , t <sub>PZH</sub>
4.5 V to 5.5 V	GND to 3.0 V	$\leq$ 2.5 ns	50 pF	500 Ω	open	7.0 V	open

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# 13. Package outline



### Fig 9. Package outline SOT108-1 (SO14)



### SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

#### Fig 10. Package outline SOT337-1 (SSOP14)



### TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

Fig 11. Package outline SOT402-1 (TSSOP14)



#### SSOP16: plastic shrink small outline package; 16 leads; body width 3.9 mm; lead pitch 0.635 mm SOT519-1

Fig 12. Package outline SOT519-1 (SSOP16)



Quad FET bus switch

# 14. Abbreviations

Table 10.	Abbreviations
Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

# 15. Revision history

Table 11. Revision	history			
Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3126_4	20091012	Product data sheet	-	CBT3126_3
Modifications:	<ul> <li>Section 7 "Li</li> </ul>	miting values" changed I <sub>CC</sub> to	I <sub>SW</sub> .	
CBT3126_3	20081209	Product data sheet	-	CBT3126_2
CBT3126_2	20081023	Product data sheet	-	CBT3126_1
CBT3126_1	20011212	Product data sheet	-	-

# **16. Legal information**

### 16.1 Data sheet status

Document status[1][2]	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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[2] The term 'short data sheet' is explained in section "Definitions".

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# **CBT3126**

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