

CBT3257A-Q100

Quad 1-of-2 multiplexer/demultiplexer

Rev. 1 — 28 November 2019

Product data sheet

1. General description

The CBT3257A-Q100 is a quad 1-of-2 high-speed TTL-compatible multiplexer/demultiplexer. The low ON resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

Output enable (\overline{OE}) and select-control (S) inputs select the appropriate nB1 and nB2 outputs for the nA input data.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- 5 Ω switch connection between two ports
- TTL-compatible input levels
- Minimal propagation delay through the switch
- Latch-up protection exceeds 100 mA per JEDEC standard JESD78 class II level A
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115B exceeds 200 V (C = 200 pF, R = 0 Ω)

3. Ordering information

Table 1. Ordering information

Type number	Temperature range	Package		
		Name	Description	Version
CBT3257APW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

4. Functional diagram

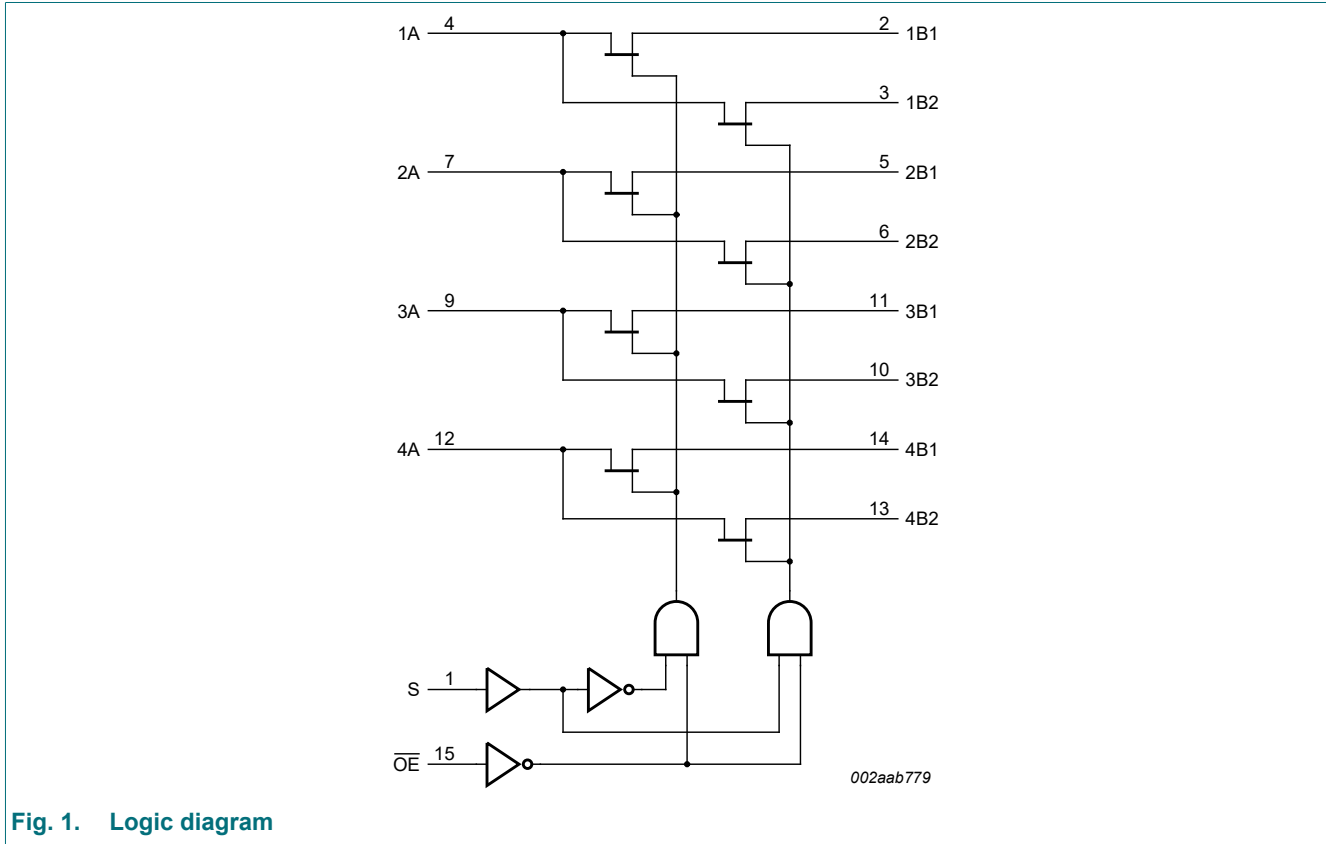


Fig. 1. Logic diagram

5. Pinning information

5.1. Pinning

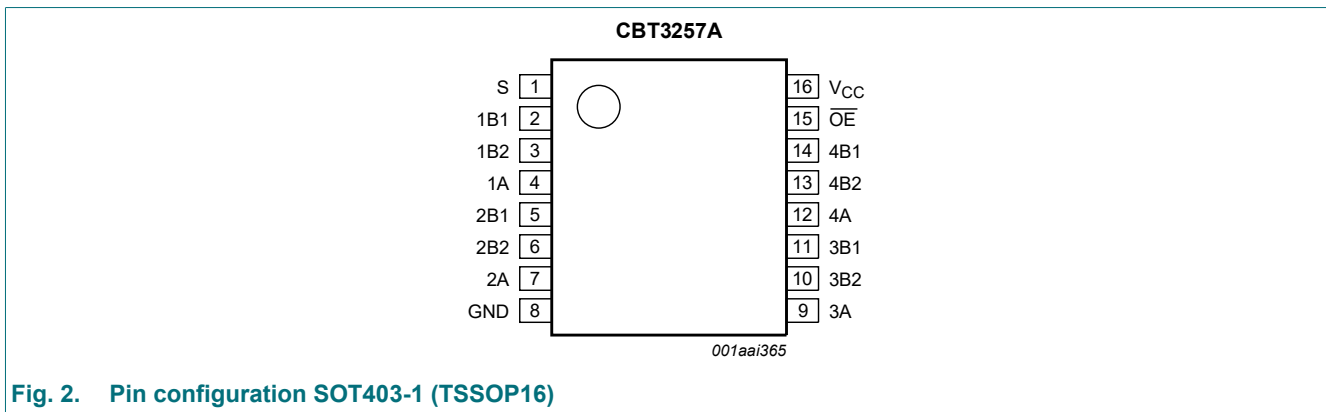


Fig. 2. Pin configuration SOT403-1 (TSSOP16)

5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
S	1	select control input
1B1, 2B1, 3B1, 4B1,	2, 5, 11, 14	B1 outputs/inputs
1B2, 2B2, 3B2, 4B2	3, 6, 10, 13	B2 outputs/inputs
1A, 2A, 3A, 4A	4, 7, 9, 12	A inputs/outputs
GND	8	ground (0 V)
$\overline{\text{OE}}$	15	output enable (active LOW)
V _{CC}	16	positive supply voltage

6. Functional description

Table 3. Function selection

H = HIGH voltage level; L = LOW voltage level; X = Don't care.

Inputs		Switch
$\overline{\text{OE}}$	S	
L	L	nA to nB1
L	H	nA to nB2
H	X	switch off

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7.0	V
V _I	input voltage	[1]	-0.5	+7.0	V
I _{SW}	switch current	continuous current through each switch	-	128	mA
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C [2]	-	500	mW

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

[2] For SOT403-1 package: P_{tot} derates linearly at 8.5 mW/K above 91 °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 _{CC}	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}	ambient temperature	operating in free-air	-40	+125	°C

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	T _{amb} = -40 °C to +85 °C			T _{amb} = -40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
V _{IK}	input clamping voltage	V _{CC} = 4.5 V; I _I = -18 mA	-	-	-1.2	-	-1.2	V
V _{pass}	pass voltage	V _I = V _{CC} = 5.0 V; I _O = -100 μA	3.6	3.9	4.2	3.6	4.4	V
I _I	input leakage current	V _{CC} = 5.5 V; V _I = GND or 5.5 V	-	-	±1	-	±15	μA
I _{CC}	supply current	V _{CC} = 5.5 V; I _O = 0 mA; V _I = V _{CC} or GND	-	-	3	-	25	μA
ΔI _{CC}	additional supply current	per input; V _{CC} = 5.5 V; one input at 3.4 V, other inputs at V _{CC} or GND [2]	-	-	2.5	-	3	mA
C _I	input capacitance	control pins; V _I = 3 V or 0 V	-	3.3	-	-	-	pF
C _{io(off)}	off-state input/output capacitance	A port; V _O = 3 V or 0 V; \overline{OE} = V _{CC}	-	9.9	-	-	-	pF
		B port; V _O = 3 V or 0 V; \overline{OE} = V _{CC}	-	6.4	-	-	-	pF
R _{ON}	ON resistance	V _{CC} = 4.5 V [3]	-	-	-	-	-	
		V _I = 0 V; I _I = 64 mA	-	5	7	-	8	Ω
		V _I = 0 V; I _I = 30 mA	-	5	7	-	8	Ω
		V _I = 2.4 V; I _I = 15 mA	-	10	15	-	17	Ω

[1] All typical values are measured 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 nA and the nBn terminals at the indicated current through the switch. The lowest voltage of the two (nA or nBn) terminals determines the ON resistance.

10. Dynamic characteristics

Table 7. Dynamic characteristics

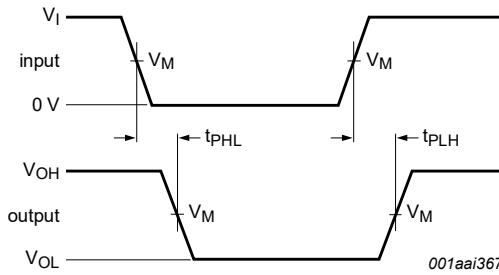
V_{CC} = 4.5 V to 5.5 V; for test circuit see Fig. 5.

Symbol	Parameter	Conditions	T _{amb} = -40 °C to +85 °C		T _{amb} = -40 °C to +125 °C		Unit
			Min	Max	Min	Max	
t _{pd}	propagation delay	nA to nBn or nBn to nA; see Fig. 3 [1][2]	-	0.25	-	0.3	ns
		S to nA; see Fig. 3 [1][2]	1.4	5.0	1.4	5.8	ns
t _{en}	enable time	\overline{OE} to nA or nBn; see Fig. 4 [2]	1.5	5.1	1.5	5.9	ns
		S to nBn; see Fig. 4 [2]	1.4	5.2	1.4	6.0	ns
t _{dis}	disable time	\overline{OE} to nA or nBn; see Fig. 4 [2]	2.2	5.5	2.2	6.4	ns
		S to nBn; see Fig. 4 [2]	1.0	5.0	1.0	5.8	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).

[2] t_{PLH} and t_{PHL} are the same as t_{pd}; t_{PZL} and t_{PZH} are the same as t_{en}; t_{PLZ} and t_{PHZ} are the same as t_{dis}.

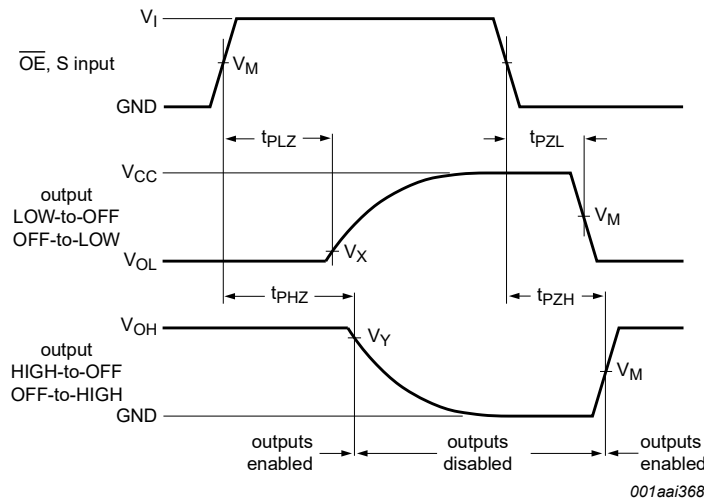
10.1. Waveforms and test circuit



Measurement points are given in Table 8.

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

Fig. 3. The input (nA; nBn) to output (nBn; nA) or input (S) to output (nA) propagation delay times



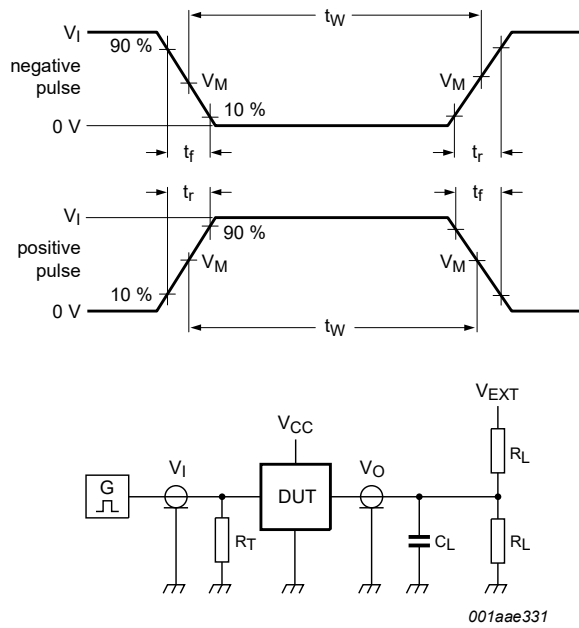
Measurement points are given in Table 8.

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

Fig. 4. Enable and disable times

Table 8. Measurement points

Supply voltage	Input		Output		
V_{CC}	V_I	V_M	V_M	V_X	V_Y
4.5 V to 5.5 V	GND to 3.0 V	1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$



Test data is given in [Table 9](#).

Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator.

V_{EXT} = External voltage for measuring switching times.

Fig. 5. Test circuit for measuring switching times

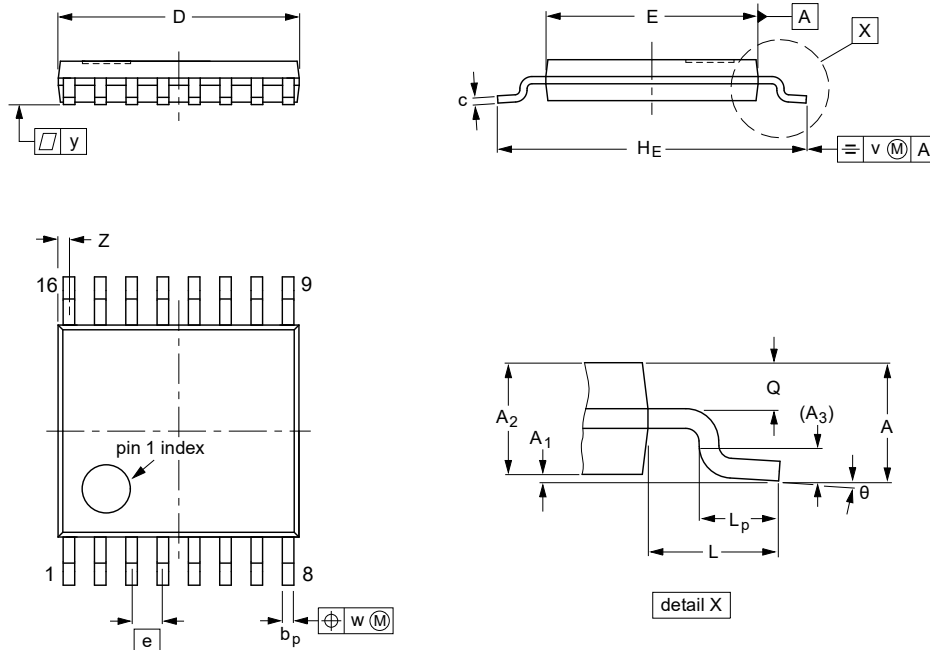
Table 9. Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
4.5 V to 5.5 V	GND to 3.0 V	≤ 2.5 ns	50 pF	500 Ω	open	7.0 V	open

11. Package outline

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1



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	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	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	0.40 0.06	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			
SOT403-1		MO-153				99-12-27 03-02-18

Fig. 6. Package outline SOT403-1 (TSSOP16)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MIL	Military
MM	Machine Model
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
CBT3257A_Q100 v.1	20191128	Product data sheet	-	-

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	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.
Product [short] data sheet	Production	This document contains the product specification.

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Contents

1. General description	1
2. Features and benefits	1
3. Ordering information	1
4. Functional diagram	2
5. Pinning information	2
5.1. Pinning.....	2
5.2. Pin description.....	3
6. Functional description	3
7. Limiting values	3
8. Recommended operating conditions	3
9. Static characteristics	4
10. Dynamic characteristics	4
10.1. Waveforms and test circuit.....	5
11. Package outline	7
12. Abbreviations	8
13. Revision history	8
14. Legal information	9

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