Dual 1-of-4 Multiplexer/Demultiplexer

CJ74CBTLV3253 Logic

1 Introduction

CJ74CBTLV3253 is a dual 1-of-4 multiplexer/ demultiplexer. The circuit has two common selection ports (S0, S1) and two enable control ports (/1OE, /2OE).

To ensure the high-impedance OFF-state during power up or power down, /1OE and /2OE should be tied to Vcc through a pull-up resistor.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

2 Available Packages

PART NUMBER	PACKAGE
CJ74CBTLV3253	SOP16
	SSOP16
	TSSOP16
	QFN3.5x2.5-16L

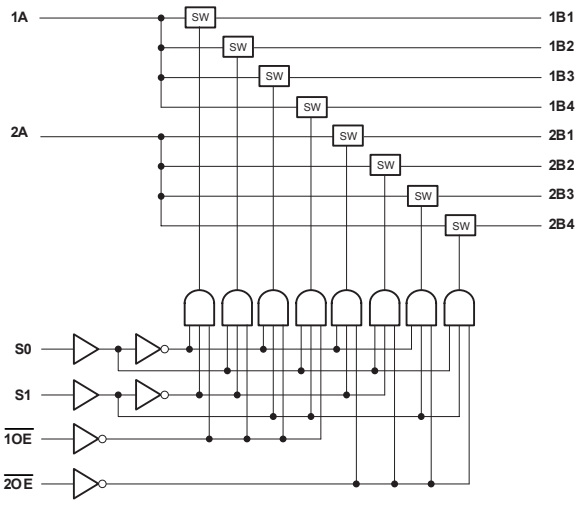
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Supply voltage range: 2.3V to 3.6V
- On-resistance: 3.2Ω (typical)
- Rail-to-rail switching on I/O ports
- CMOS low power consumption
- I_{OFF} circuitry provides partial Power-down mode operation
- Temperature range: -40°C to +125°C

4 Applications

- Video Broadcasting: IP-Based Multi-Format Transcoders
- Video Communications Systems



Logic diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74CBTLV3253AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74CBTLV3253SEA	SSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74CBTLV3253BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active
CJ74CBTLV3253QEN	QFN3.5x2.5-16L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:
Active: Recommended for new products;
Customized: Products manufactured to meet the specific needs of customers;
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;
NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

6.1 Pin Configuration

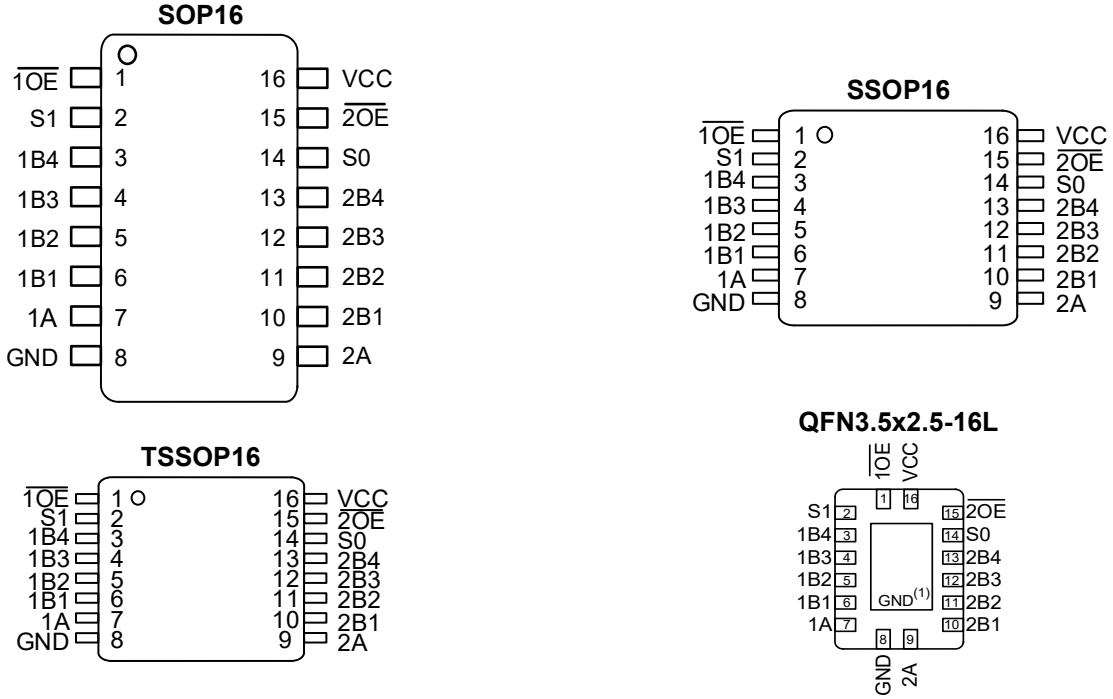


Figure 6-1 Pin configuration

Note:

(1) If it is soldered the solder land should remain floating or be connected to GND.

6.2 Pin Function

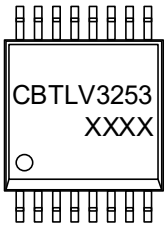
PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	$\overline{1OE}$	I	Output Enable Input (Active Low)
2	S1	I	Select input
3	1B4	I/O	B4 input/output
4	1B3	I/O	B3 input/output
5	1B2	I/O	B1 input/output
6	1B1	I/O	B2 input/output
7	1A	I/O	A1 input/output
8	GND	G	Ground (0V)
9	2A	I/O	A2 input/output
10	2B1	I/O	B1 input/output
11	2B2	I/O	B2 input/output
12	2B3	I/O	B3 input/output
13	2B4	I/O	B4 input/output
14	S0	I	Select input
15	$\overline{2OE}$	I	Output Enable Input (Active Low)
16	VCC	P	Supply voltage

(1) I-Input, O-Output, P-Power, G-Ground

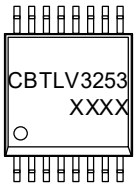
6.3 Marking Information

SOP16

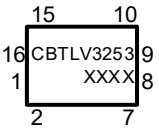
SSOP16



TSSOP16



QFN3.5x2.5-16L



XXXX: Code, indicates weekly record information.

7 Specifications

7.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	Supply voltage	-	-0.5	+4.6	V
V_I	Input voltage	Control inputs	-0.5	+4.6	V
V_{SW}	Switch voltage	Enable and disable mode	-0.5	V_{CC}+0.5	V
I_{IK}	Input clamping current	V_I<-0.5V	-50	-	mA
I_{SK}	Switch clamping current	V_I<-0.5V	-50	-	mA
I_{SW}	Switch current	V_{SW}=0 to V_{CC}	-	±128	mA
I_{CC}	Supply current	-	-	±100	mA
I_{GND}	Ground current	-	-100	-	mA
T_{stg}	Storage temperature	-	-65	150	°C
T_L	Soldering temperature	10S	-	260	°C

Note: Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CC}	Supply voltage	-	2.3	-	3.6	V
V_I	Input voltage	-	0	-	3.6	V
V_{SW}	Switch voltage	Enable and disable mode	0	-	V_{CC}	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C

7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
$V_{ESD-HBM}$	Electrostatic discharge	Human body model (HBM)(1)	±4000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

7.4 Electrical Characteristics

7.4.1 DC Characteristics 1

T_{amb}=-40°C to +85°C, GND=0V, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{IH}	HIGH-level input voltage	V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=3.0V to 3.6V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=3.0V to 3.6V		-	-	0.9	V
I_I	Input leakage current	Pin $\overline{OE}$,S ; V_I=GND to V_{CC}; V_{CC}= 3.6V		-	-	±1	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}=3.6V		-	-	±1	uA
$I_{S(ON)}$	ON-state leakage current	V_{CC}=3.6V		-	-	±1	uA
I_{OFF}	Power-off leakage current	V_I or V_O=0 V to 3.6 V; V_{CC}=0V		-	-	±10	uA
I_{CC}	Supply current	V_I=GND or V_{CC}; I_O=0 A; V_{SW}=GND or V_{CC}; V_{CC}=3.6V		-	-	10	uA
ΔI_{CC}	Additional supply current	Pin $\overline{OE}$; V_I=V_{CC} - 0.6V; V_{SW}=GND or V_{CC};V_{CC}=3.6V		-	-	300	uA
R_{ON}	ON resistance	V_{CC}=2.3V to 2.7V; See Figure 8-2 to 8-4	I_{SW}=64mA; V_I=0V	-	3.3	8	Ω
			I_{SW}=24mA; V_I=0V	-	3.2	8	Ω
			I_{SW}=15mA; V_I=1.7V	-	10.8	40	Ω
		V_{CC}=3.0V to 3.6V; See Figure 8-5 to 8-7	I_{SW}=64mA; V_I=0V	-	2.8	7	Ω
			I_{SW}=24mA; V_I=0V	-	2.8	7	Ω
			I_{SW}=15mA; V_I=2.4V	-	7.1	15	Ω

Note:

(1) All typical values are measured at V_{CC}=2.5V, 3.3V (unless otherwise specified) and T_{amb}=25°C.

7.4.2 DC Characteristics 2

T_{amb}=-40°C to +125°C, GND=0V, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{IH}	HIGH-level input voltage	V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=3.0V to 3.6V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=3.0V to 3.6V		-	-	0.9	V
I_I	Input leakage current	Pin $\overline{OE}$,S ;V_I = GND to V_{CC}; V_{CC}= 3.6V		-	-	±20	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}= 3.6V		-	-	±20	uA
$I_{S(ON)}$	ON-state leakage current	V_{CC}= 3.6V		-	-	±20	uA
I_{OFF}	Power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0V		-	-	±50	uA
I_{CC}	Supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{SW} = GND or V_{CC}; V_{CC} = 3.6V		-	-	50	uA
ΔI_{CC}	Additional supply current	Pin $\overline{OE}$; V_I = V_{CC} - 0.6V; V_{SW} = GND or V_{CC};V_{CC}= 3.6V		-	-	2000	uA
R_{ON}	ON resistance	V_{CC}=2.3V to 2.7V; See Figure 8-2 to 8-4	I_{SW} = 64mA; V_I = 0V	-	-	15	Ω
			I_{SW} = 24mA; V_I = 0V	-	-	15	Ω
			I_{SW} = 15mA; V_I = 1.7V	-	-	60	Ω
		V_{CC}=3.0V to 3.6V; See Figure 8-5 to 8-7	I_{SW} = 64mA; V_I = 0V	-	-	11	Ω
			I_{SW} = 24mA; V_I = 0V	-	-	11	Ω
			I_{SW} = 15mA; V_I = 2.4V	-	-	25.5	Ω

7.4.3 AC Characteristics 1

T_{amb}=-40°C to +85°C, GND=0V, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.(1)	MAX.	UNIT
t_{PLH}, t_{PHL}	Propagation delay	nA to nBn; nBn to nA; See Figure 8-9	V_{CC}=2.3V to 2.7V	-	-	0.15	ns
			V_{CC}=3.0V to 3.6V	-	-	0.15	ns
		S to nA; See Figure 8-9	V_{CC}=2.3V to 2.7V	-	2.2	6.8	ns
			V_{CC}=3.0V to 3.6V	-	2.0	5.5	ns
t_{PZH}, t_{PZL}	Enable time	$\overline{OE}$ to nA/nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	2.1	5.0	ns
			V_{CC}=3.0V to 3.6V	-	1.9	4.8	ns
		Sn to nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	2.1	4.3	ns
			V_{CC}=3.0V to 3.6V	-	1.9	4.0	ns
t_{PLZ}, t_{PHZ}	Disable time	$\overline{OE}$ to nA/nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	2.6	5.5	ns
			V_{CC}=3.0V to 3.6V	-	3.2	5.4	ns
		S to nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	2.0	4.8	ns
			V_{CC}=3.0V to 3.6V	-	2.0	4.5	ns

(1) All typical values are measured at V_{CC} = 2.5V/3.3V (unless otherwise specified), and T_{amb}=25°C.

7.4.4 AC Characteristics 2

T_{amb}=-40°C to +125°C, GND=0V, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
t_{PLH}, t_{PHL}	Propagation delay	nA to nBn; nBn to nA; See Figure 8-9	V_{CC}=2.3V to 2.7V	-	-	0.25	ns
			V_{CC}=3.0V to 3.6V	-	-	0.25	ns
		S to nA; See Figure 8-9	V_{CC}=2.3V to 2.7V	-	-	7.5	ns
			V_{CC}=3.0V to 3.6V	-	-	6.1	ns
t_{PZH}, t_{PZL}	Enable time	$\overline{OE}$ to nA/nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	-	5.5	ns
			V_{CC}=3.0V to 3.6V	-	-	5.3	ns
		Sn to nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	-	4.7	ns
			V_{CC}=3.0V to 3.6V	-	-	4.4	ns
t_{PLZ}, t_{PHZ}	Disable time	$\overline{OE}$ to nA/nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	-	6.1	ns
			V_{CC}=3.0V to 3.6V	-	-	5.9	ns
		S to nBn; See Figure 8-10	V_{CC}=2.3V to 2.7V	-	-	5.3	ns
			V_{CC}=3.0V to 3.6V	-	-	5.0	ns

8 Detailed Description

8.1 Overview

CJ74CBTLV3253 is a dual 1-of-4 multiplexer/demultiplexer. The circuit has two common selection ports (S0, S1) and two enable control ports (/1OE, /2OE).

To ensure the high-impedance OFF-state during power up or power down, /1OE and /2OE should be tied to Vcc through a pull-up resistor.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

8.2 Functional Block Diagram

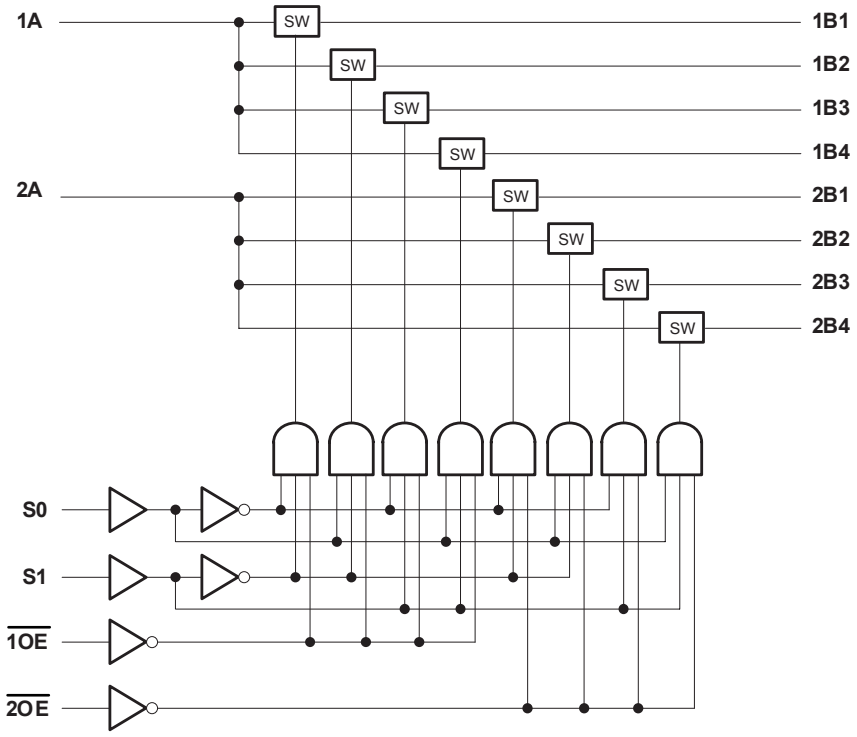


Figure 8-1 Logic diagram

8.3 Function Table

INPUT				FUNCTION SWITCH
$\overline{1OE}$	$\overline{2OE}$	S1	S0	
L	L	L	L	nA=nB1
L	L	L	H	nA=nB2
L	L	H	L	nA=nB3
L	L	H	H	nA=nB4
X	H	X	X	2A and 2Bn are not connected
H	X	X	X	1A and 1Bn are not connected

Note:

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.4 Testing Circuit

8.4.1 ON resistance Testing Waveform

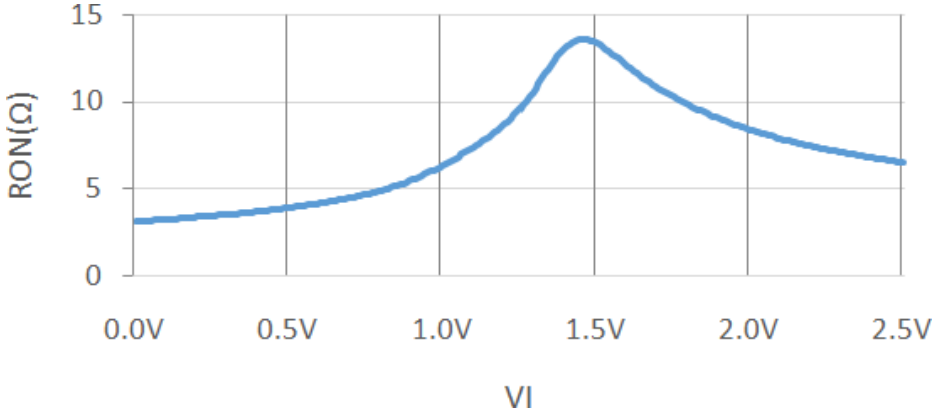


Figure 8-2 ON resistance as a function of input voltage (V_{CC}=2.5V, I_{SW}=15mA, T_{amb}=25°C)

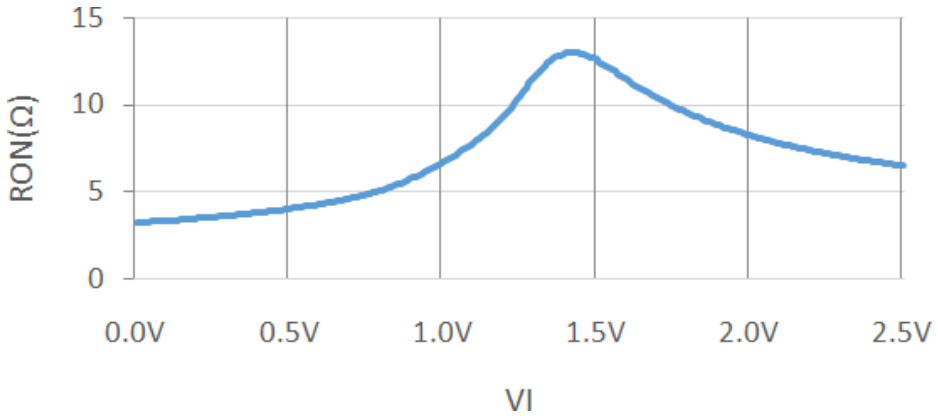


Figure 8-3 ON resistance as a function of input voltage (V_{CC}=2.5V, I_{SW}=24mA, T_{amb}=25°C)

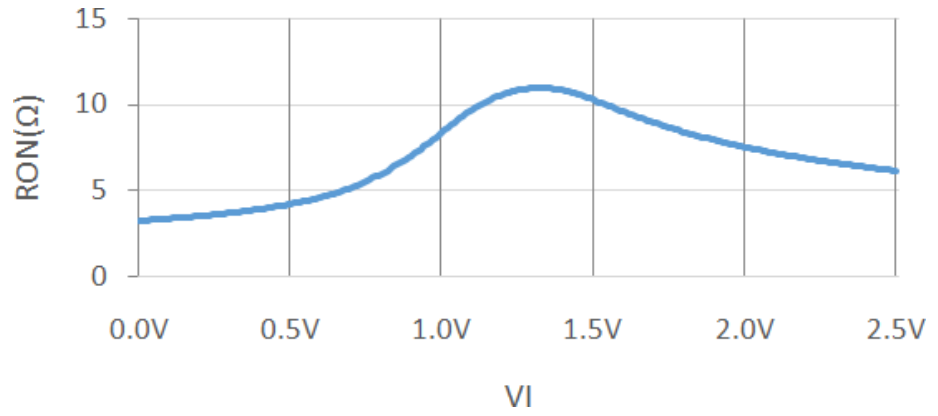


Figure 8-4 ON resistance as a function of input voltage (V_{CC}=2.5V, I_{SW}=64mA, T_{amb}=25°C)

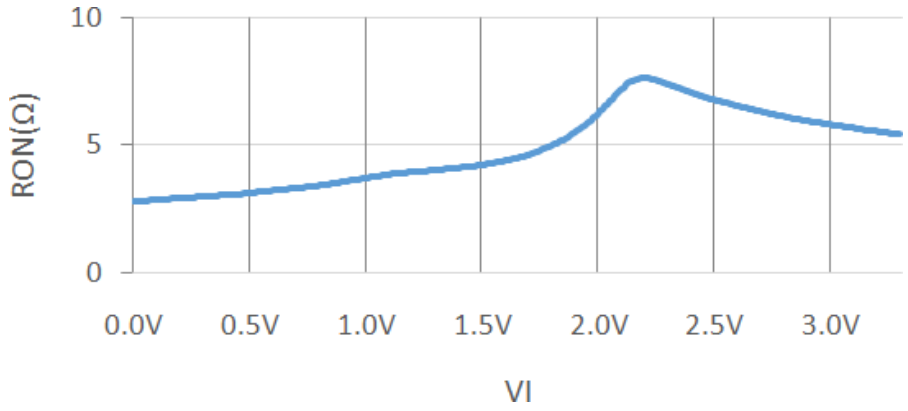


Figure 8-5 ON resistance as a function of input voltage (V_{CC}=3.3V, I_{SW}=15mA, T_{amb}=25°C)

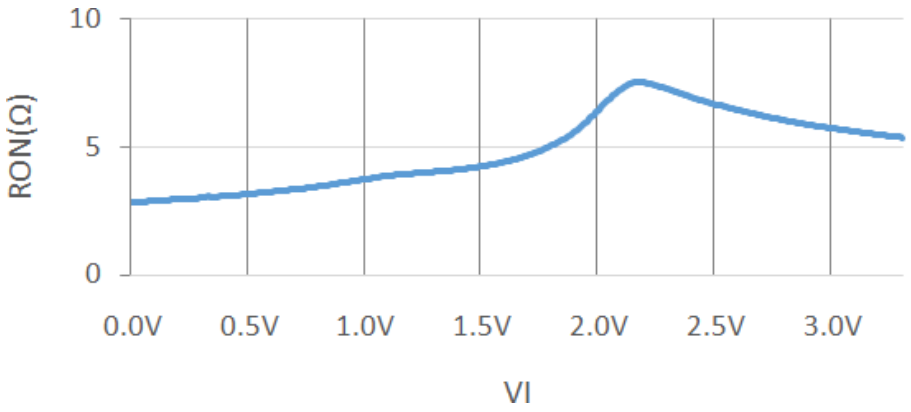


Figure 8-6 ON resistance as a function of input voltage (V_{CC}=3.3V, I_{SW}=24mA, T_{amb}=25°C)

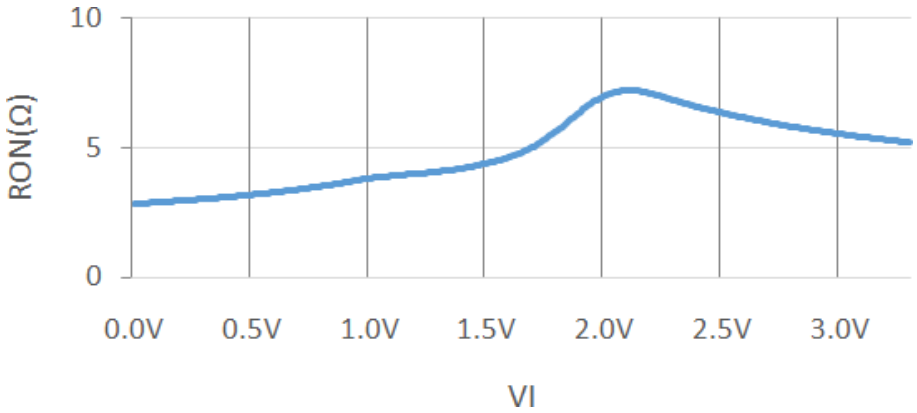


Figure 8-7 ON resistance as a function of input voltage (V_{CC}=3.3V, I_{SW}=64mA, T_{amb}=25°C)

8.4.2 AC Testing Circuit

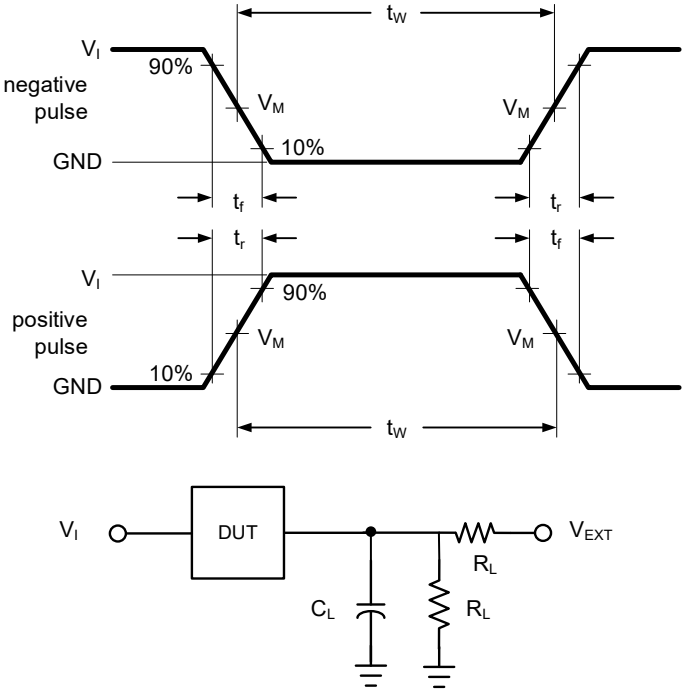


Figure 8-8 Test circuit for measuring switching times

Definitions for test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

8.4.3 AC Testing Waveforms

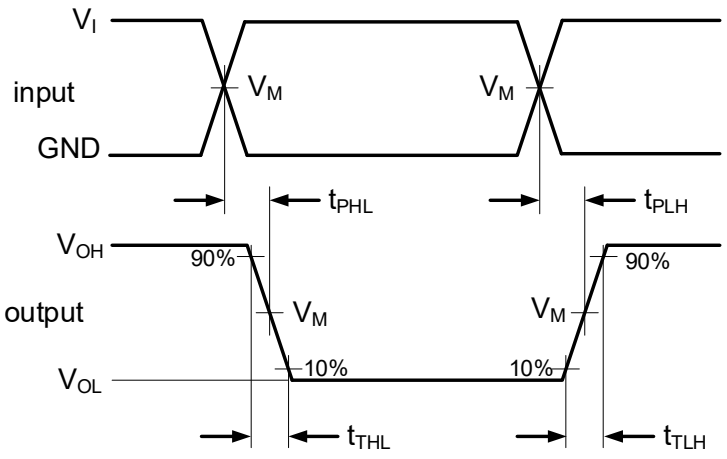


Figure 8-9 Testing waveforms of propagation delay from input (nA/nBn) to output (nBn/nA) and propagation delay from input (S) to output (nA)

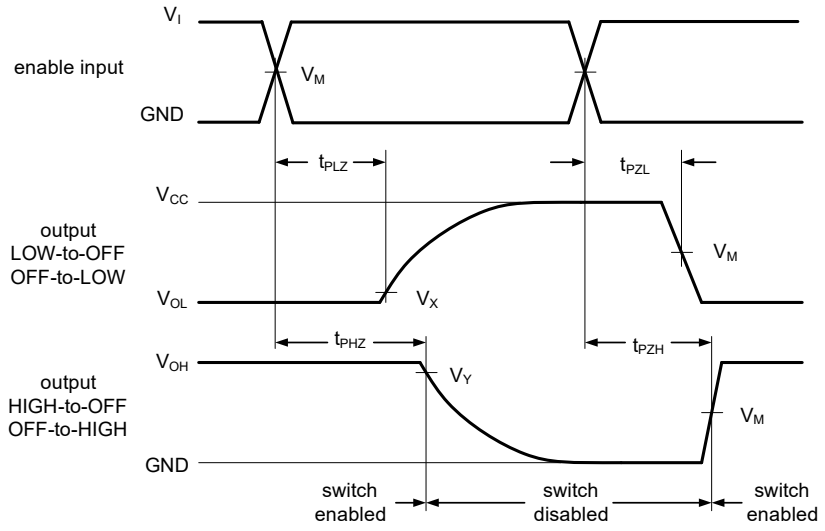


Figure 8-10 Testing waveform of enable and disable time

8.4.4 Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT		
V_{CC}	V_I	V_M	V_M	V_X	V_Y
2.3V to 2.7V	V_{CC}	0.5xV_{CC}	0.5xV_{CC}	V_{OL}+0.15V	V_{OH}-0.15V
3.0V to 3.6V	V_{CC}	0.5xV_{CC}	0.5xV_{CC}	V_{OL}+0.3V	V_{OH}-0.3V

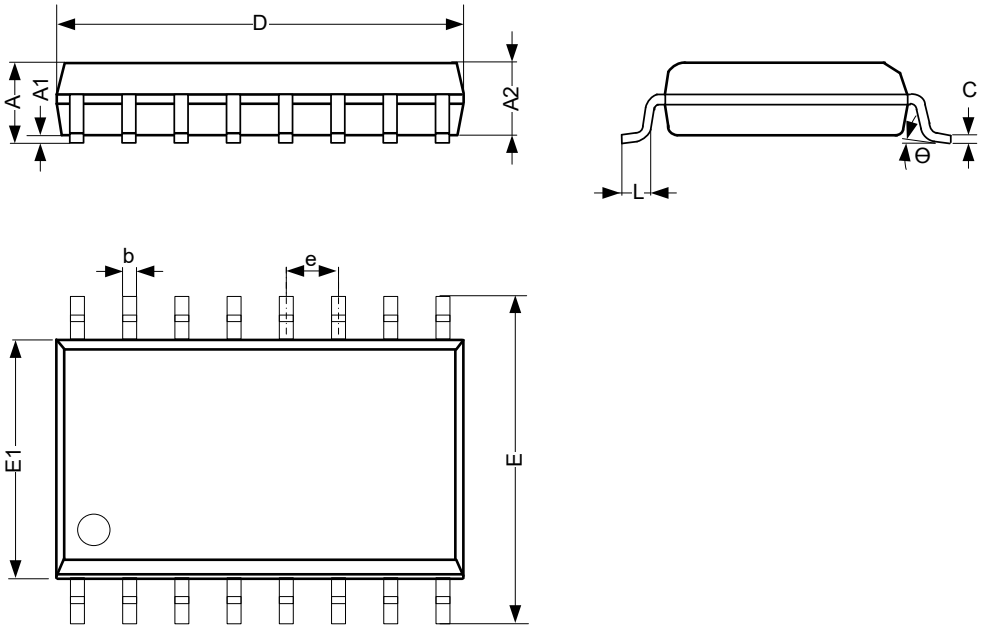
8.4.5 Test Data

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CC}	V_I	t_r , t_f	C_L	R_L	t_{PLH},t_{PHL}	t_{PHZ},t_{PZH}	t_{PLZ} ,t_{PZL}
2.3V to 2.7V	V_{CC}	≤ 3.0ns	30pF	500Ω	Open	GND	2xV_{CC}
3.0V to 3.6V	V_{CC}	≤ 3.0ns	50pF	500Ω	Open	GND	2xV_{CC}

9 Mechanical Information

9.1 SOP16 Mechanical Information

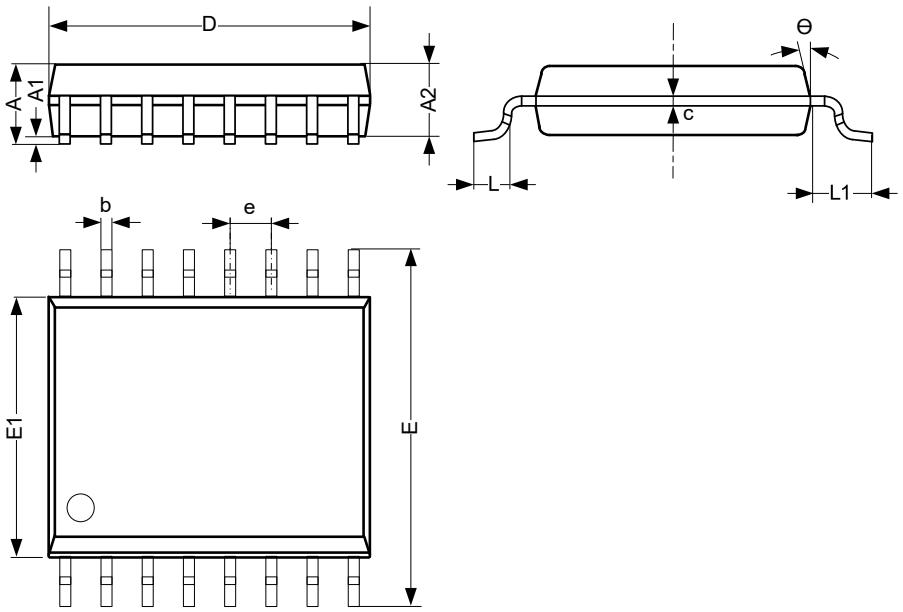
9.1.1 SOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.35	-	1.80
A1	0.10	-	0.25
A2	1.25	-	1.55
b	0.33	-	0.51
c	0.19	-	0.25
D	9.50	-	10.10
E	5.80	-	6.30
E1	3.70	-	4.10
e	1.27 BSC		
L	0.35	-	0.89
θ	0°	-	8°
Unit: mm			

9.2 SSOP16 Mechanical Information

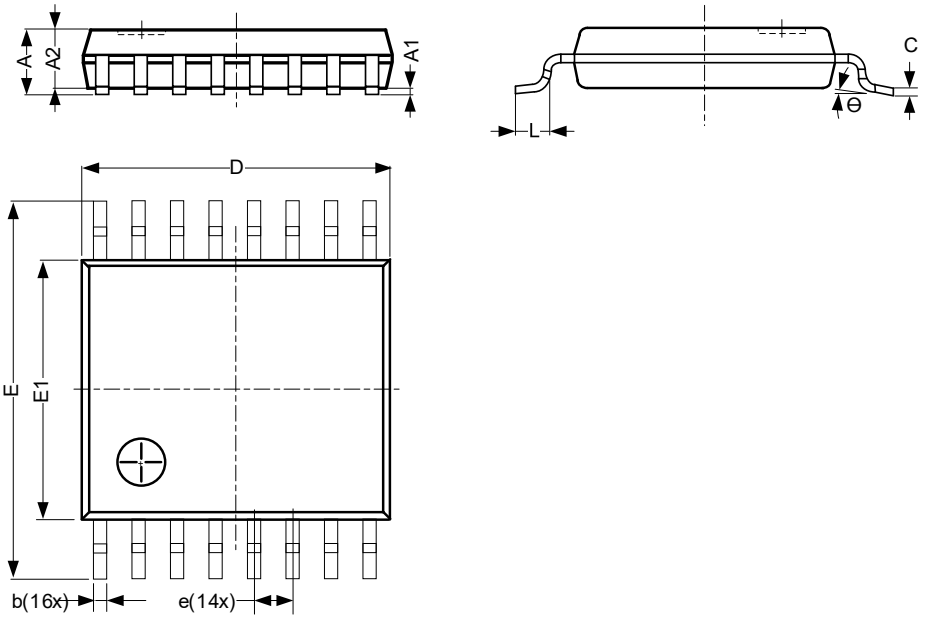
9.2.1 SSOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.75
A1	0.02	-	0.23
A2	1.30	-	1.50
b	0.23	-	0.31
c	0.20	-	0.24
D	4.70	-	5.10
E	5.80	-	6.25
E1	3.80	-	4.02
e	0.635 BSC		
L	0.45	-	0.80
L1	1.05 BSC		
θ	0°	-	8°
Unit: mm			

9.3 TSSOP16 Mechanical Information

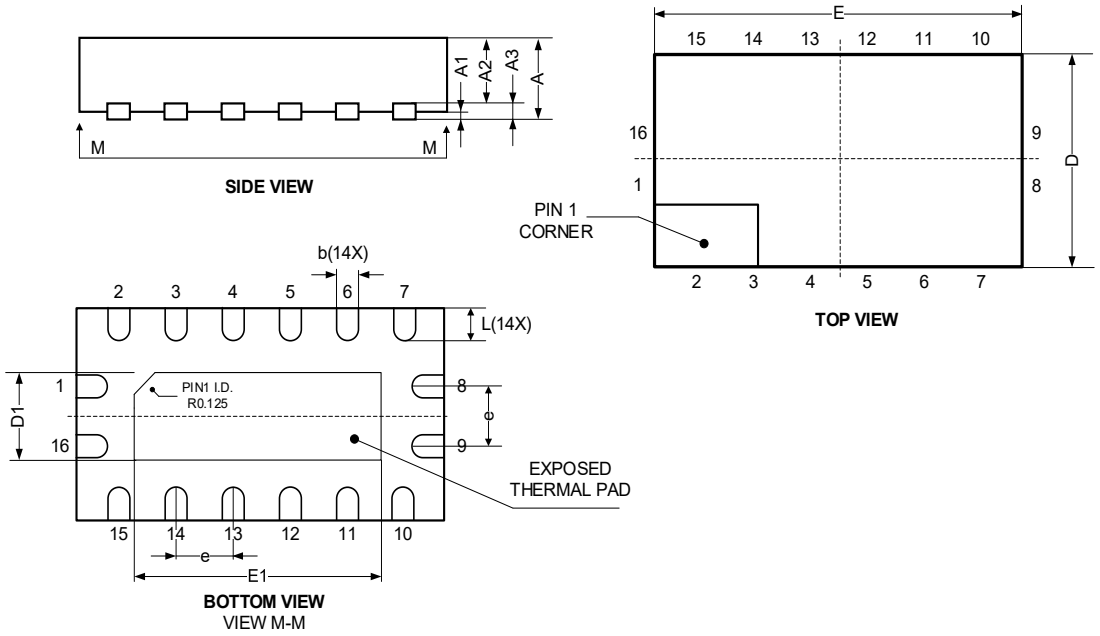
9.3.1 TSSOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.20
A1	0.05	-	0.15
A2	0.80	-	1.05
b	0.19	-	0.30
c	0.09	-	0.20
D	4.90	-	5.10
E	6.20	-	6.60
E1	4.30	-	4.50
e	0.65 BSC		
L	0.45	-	0.75
Θ	0°	-	8°
Unit: mm			

9.4 QFN3.5x2.5-16L Mechanical Information

9.4.1 QFN3.5x2.5-16L Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.80	-	1.00
A1	0.00	-	0.05
A2	0.60	-	0.70
A3	-	0.20	-
D	2.40	-	2.60
E	3.40	-	3.60
e	0.50 BSC		
b	0.18	-	0.30
L	0.30	-	0.50
D1	0.85	-	1.15
E1	1.85	-	2.15
Unit: mm			

10 Notes and Revision History

10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- ***https:www.jscj-elec.com*** for more details.

10.2 Notes

Electrostatic Discharge Caution

This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

Any person who purchases or uses JSCJ products for design shall: 1. Select products suitable for circuit application and design; 2. Design, verify and test the rationality of circuit design; 3. Procedures to ensure that the design complies with relevant laws and regulations and the requirements of such laws and regulations. JSCJ makes no warranty or representation as to the accuracy or completeness of the information contained in this data sheet and assumes no responsibility for the application or use of any of the products described in this data sheet.

Without the written consent of JSCJ, this product shall not be used in occasions requiring high quality or high reliability, including but not limited to the following occasions: medical equipment, military facilities and aerospace. JSCJ shall not be responsible for casualties or property losses caused by abnormal use or application of this product.

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