4-bit 1-of-2 FET Multiplexer/Demultiplexer with Charge Pump

CJ74CB3Q3257 Logic

1 Introduction

The CJ74CB3Q3257 is a quad high-bandwidth single-pole, double-throw FET bus switch. The device features one select input (S) and one output enable input (/OE). An internal charge-pump increases the gate voltage of the NMOS pass transistor, enabling the device to pass 5.5V signals when V_{CC}=3.3V.

2 Available Packages

PART NUMBER	PACKAGE
CJ74CB3Q3257	SOP16
	SSOP16
	TSSOP16
	QFN3.5x2.5-16L

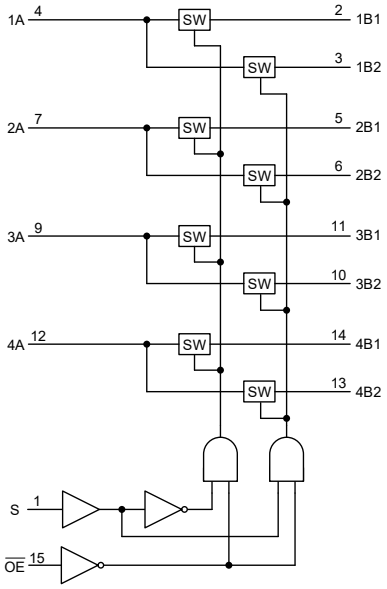
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Supply voltage range: 2.3V to 3.6V
- Overvoltage tolerant switch inputs:
  - V_{CC}=2.5V, V_{SW}= 0 to 5.5V
  - V_{CC}=3.3V, V_{SW}= 0 to 5.5V
- Low power consumption: I_{CC} = 0.5mA (typical)
- Rail-to-Rail analog switches
- Specified from: -40°C to +125°C

4 Applications

- IP Phones: wired and wireless
- Optical modules
- Optical networking: video over fiber and EPON
- Private branch exchange (PBX)
- WiMAX and wreless infrastructure equipment



Logic diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74CB3Q3257AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74CB3Q3257SEA	SSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74CB3Q3257BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active
CJ74CB3Q3257QEN	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

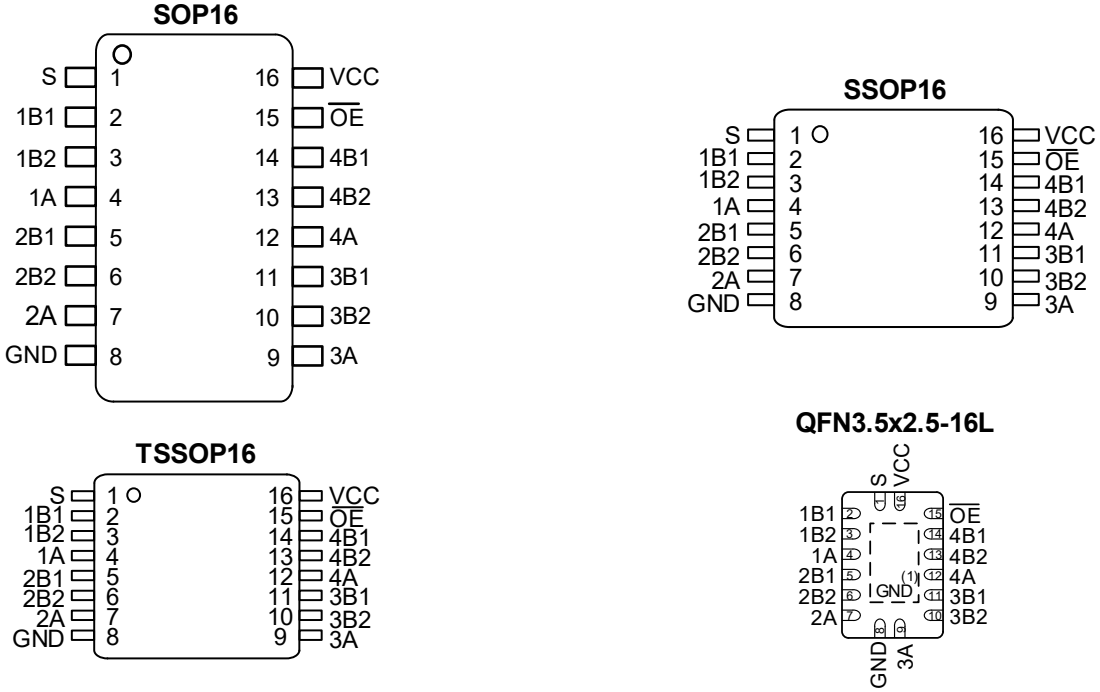


Figure 6-1 Pin configuration

Note:

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

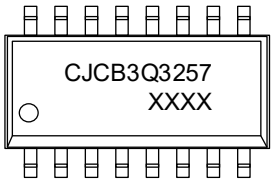
6.2 Pin Function

PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	S	I	Select input
2	1B1	I/O	Independent input/output
3	1B2	I/O	Independent input/output
4	1A	I/O	Common input/output
5	2B1	I/O	Independent input/output
6	2B2	I/O	Independent input/output
7	2A	I/O	Common input/output
8	GND	G	Ground (0V)
9	3A	I/O	Common input/output
10	3B2	I/O	Independent input/output
11	3B1	I/O	Independent input/output
12	4A	I/O	Common input/output
13	4B2	I/O	Independent input/output
14	4B1	I/O	Independent input/output
15	$\overline{OE}$	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



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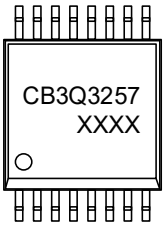
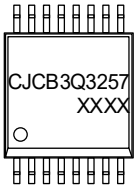
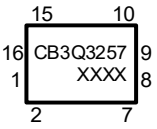


TSSOP16



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	S, $\overline{OE}$ input	-0.5	+7.0	V
V_{SW}	Switch voltage	-	-0.5	+7.0	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	-	-	±120	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	S, $\overline{OE}$ input	0	-	5.5	V
V_{SW}	Switch voltage	-	0	-	5.5	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	S, $\overline{OE}$ input; V_{CC}=2.3V to 2.7V	0	-	20	ns/V
		S, $\overline{OE}$ input; V_{CC}=2.7V to 3.6V	0	-	10	ns/V

7.3 Electrical Characteristics

7.3.1 DC Characteristics

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}=2.7V to 3.6V	2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=2.3V to 2.7V	-	-	0.7	V
		V_{CC}=2.7V to 3.6V	-	-	0.8	V
V_{IK}	Input clamping voltage	Pin nA, nBn; I_I = -18mA; V_{CC}= 3.6V	-	-	-1.8	V
I_I	Input leakage current	Pin $\overline{OE}$, S; V_I=GND to 5.5V;V_{CC}= 3.6V	-	-	±1	uA
$I_{S(OFF)}$	OFF-state leakage current	Pin nA, nBn; V_{CC}=3.6V	-	-	±1	uA
I_{OFF}	Power-off leakage current	V_{SW} or V_I= 0V to 5.5V; V_{CC}=0V	-	-	±1	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	-	0.5	0.8	mA
ΔI_{CC}	Additional supply current	Pin $\overline{OE}$, S; One input at 3V; Other inputs at V_{CC} or GND; V_{CC}=3.6V	-	-	30	uA
R_{ON}	ON resistance	I_{SW}=30mA; V_I=0V; V_{CC}=2.3V	-	2.7	6	Ω
		I_{SW}=-15mA; V_I=1.7V; V_{CC}=2.3V	-	2.9	6	Ω
		I_{SW}=30mA; V_I=0V; V_{CC}=3.0V	-	2.7	6	Ω
		I_{SW}=-15mA; V_I=2.4V; V_{CC}=3.0V	-	3.1	6	Ω

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

7.3.2 AC Characteristics

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 8-4	V_{CC}=2.3V to 2.7V	-	-	0.12	ns
			V_{CC}=3.0V to 3.6V	-	-	0.20	ns
		S to nA; See Figure 8-4	V_{CC}=2.3V to 2.7V	1.5	-	9.0	ns
			V_{CC}=3.0V to 3.6V	1.5	-	7.5	ns
t_{PZH}, t_{PZL}	Enable time	$\overline{OE}$ to nA/nBn; See Figure 8-5	V_{CC}=2.3V to 2.7V	1.5	-	9.0	ns
			V_{CC}=3.0V to 3.6V	1.5	-	7.5	ns
		S to nBn; See Figure 8-5	V_{CC}=2.3V to 2.7V	1.5	-	9.0	ns
			V_{CC}=3.0V to 3.6V	1.5	-	7.5	ns
t_{PLZ}, t_{PHZ}	Disable time	$\overline{OE}$ to nA/nBn; See Figure 8-5	V_{CC}=2.3V to 2.7V	1.5	-	9.0	ns
			V_{CC}=3.0V to 3.6V	1.5	-	7.5	ns
		S to nBn; See Figure 8-5	V_{CC}=2.3V to 2.7V	1.5	-	9.0	ns
			V_{CC}=3.0V to 3.6V	1.5	-	7.5	ns
f_{max}	Maximum frequency	Pin $\overline{OE}$, S; V_O>V_{CC}; V_I=5V; R_L≥1MΩ; C_L=0pF	V_{CC}=2.3V to 2.7V	-	-	5	MHz
			V_{CC}=3.0V to 3.6V	-	-	18	MHz

8 Detailed Description

8.1 Overview

The CJ74CB3Q3257 is a quad high-bandwidth single-pole, double-throw FET bus switch. The device features one select input (S) and one output enable input (/OE). An internal charge-pump increases the gate voltage of the NMOS pass transistor, enabling the device to pass 5.5V signals when V_{CC}=3.3V.

8.2 Functional Block Diagram

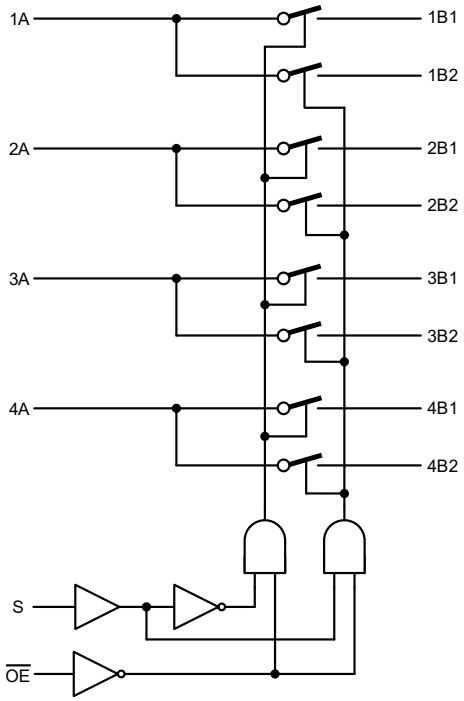


Figure 8-1 Logic diagram

8.3 Function Table

INPUT		FUNCTION SWITCH
$\overline{OE}$	S	
L	L	nA=nB1
L	H	nA=nB2
H	X	Z (switch off)

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.4 Testing Circuit

8.4.1 ON resistance Testing Waveform

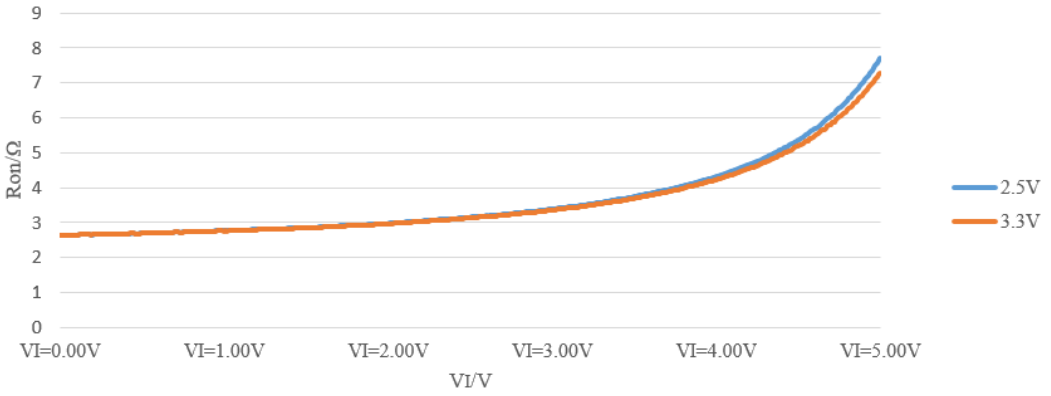


Figure 8-2 Typical ON resistance as a function of input voltage

8.4.2 AC Testing Circuit

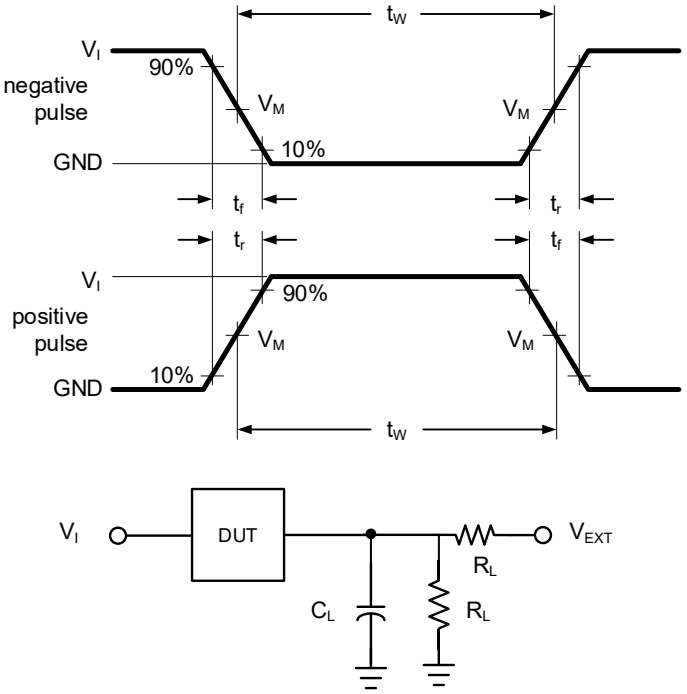


Figure 8-3 Test circuit for measuring switching times

Definitions for test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

8.4.3 AC Testing Waveforms

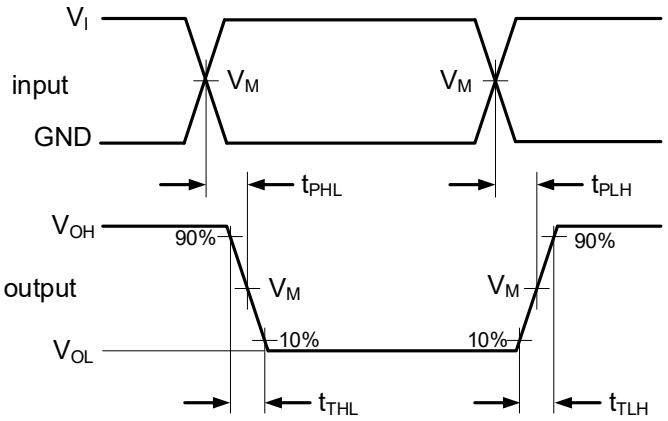


Figure 8-4 Propagation delay from input (nA/nBn) to output (nBn/nA) and testing waveforms of propagation delay from input (S) to output (nA)

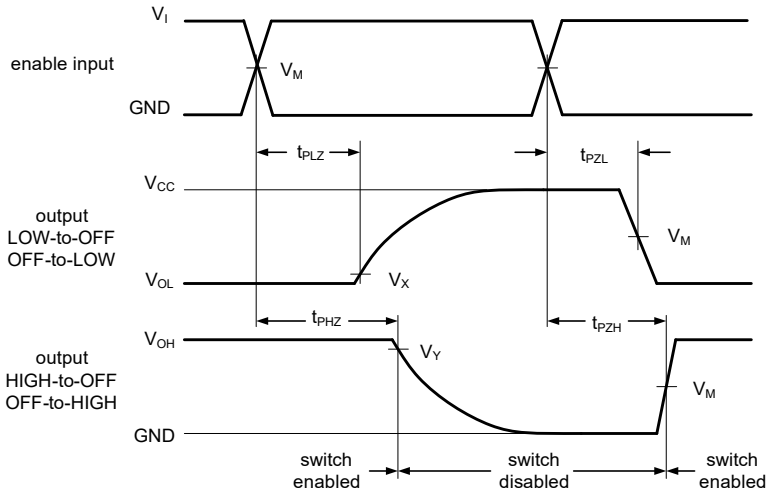


Figure 8-5 Testing waveform of enable and disable time

8.4.4 Measurement Points

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

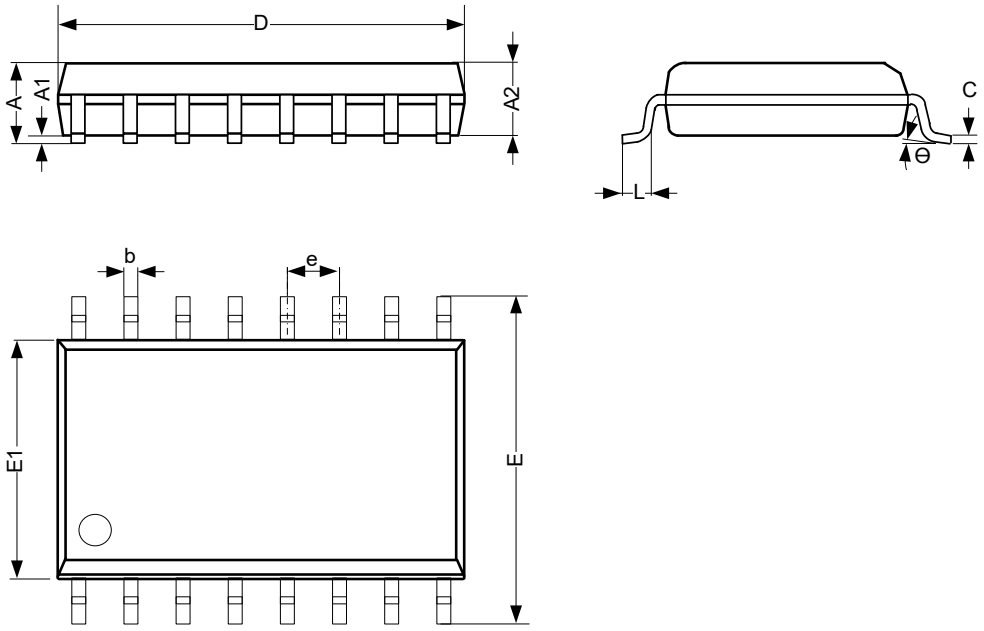
8.4.5 Test Data

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}	≤ 2.5ns	30pF	500Ω	Open	GND	2xV_{CC}
3.0V to 3.6V	V_{CC}	≤ 2.5ns	50pF	500Ω	Open	GND	2xV_{CC}

9 Mechanical Information

9.1 SOP16 Mechanical Information

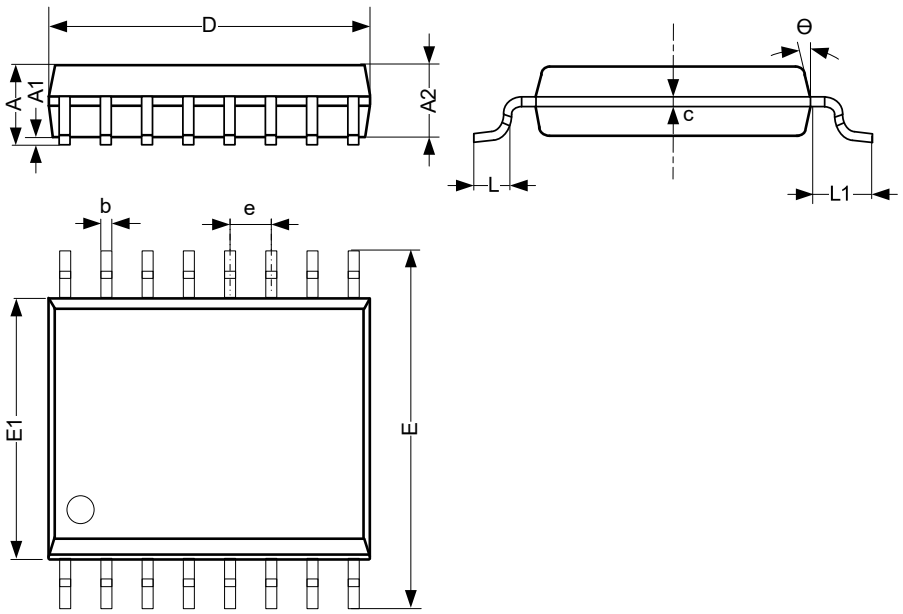
9.1.1 SOP16 Outline Dimensions



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

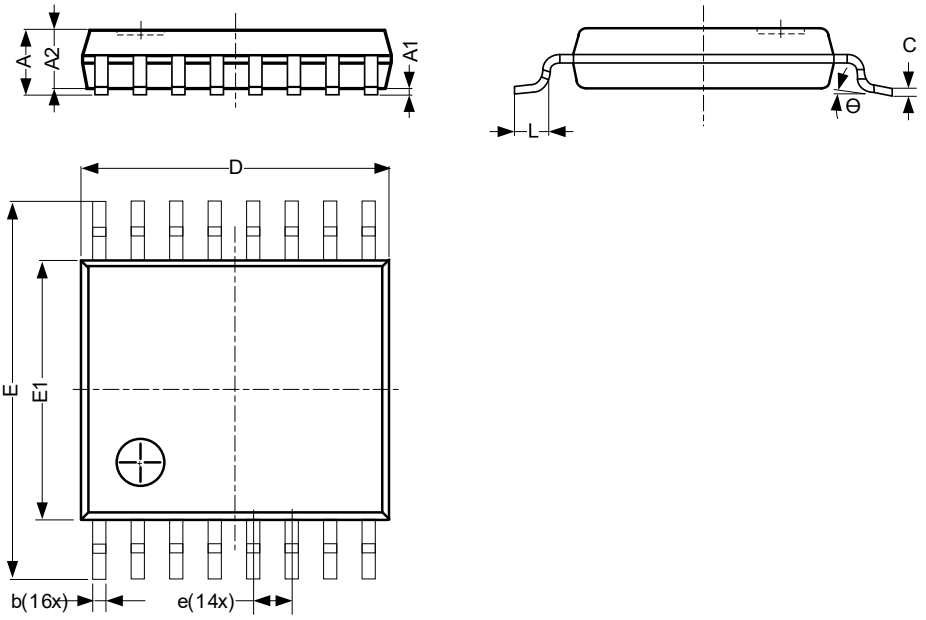
9.2.1 SSOP16 Outline Dimensions



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

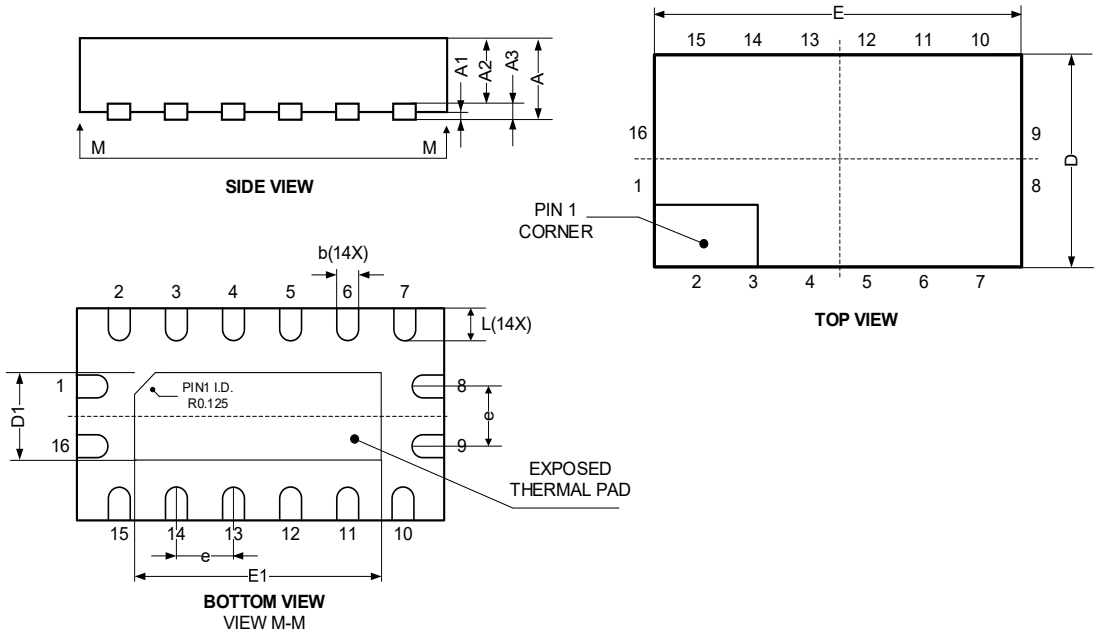
9.3.1 TSSOP16 Outline Dimensions



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

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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.

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