1、General Description

The 74LV1T34 is a single, level translating buffer. The low threshold inputs support 1.8V input logic at V_{CC}=3.3V and can be used in 1.8V to 3.3V level up translation. In addition, the 5V tolerant input pins enable level down translation (3.3V to 2.5V output at V_{CC}=2.5V). The output level is referenced to the supply voltage and supports 1.8V, 2.5V, 3.3V and 5.0V CMOS levels. The wide V_{CC} range permits the generation of output levels to connect to controllers or processors.

Features:

- Single supply voltage translator at 1.8V, 2.5V, 3.3V and 5.0V
- Up translation

1.2V to 1.8V at V_{CC}=1.8V
1.5V to 2.5V at V_{CC}=2.5V
1.8V to 3.3V at V_{CC}=3.3V
3.3V to 5.0V at V_{CC}=5.0V

- Down translation

3.3V to 1.8V at V_{CC}=1.8V
3.3V to 2.5V at V_{CC}=2.5V
5.0V to 3.3V at V_{CC}=3.3V

- 5V tolerant inputs
- Specified from -40℃ to +125℃
- Packaging information: TSSOP-5

2、Block Diagram And Pin Description

2.1、Block Diagram

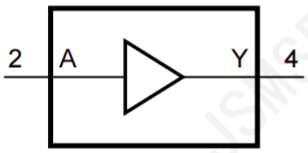


Figure 1. Logic symbol

Figure 2. IEC logic symbol

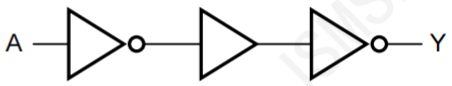
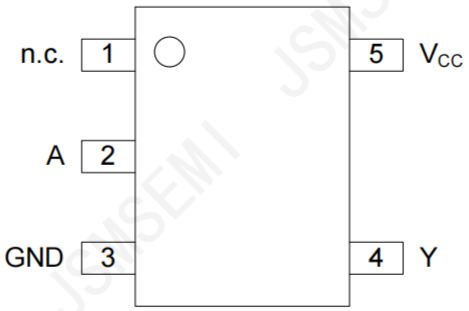


Figure 3. Logic diagram

Ordering Information

Ordernumber	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
74LV1T34GWH-JSM	TSSOP-5	CWXX	-40 to 125°C	3	T&R,3000	Rohs

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	n.c.	not connected
2	A	data input
3	GND	ground (0V)
4	Y	data output
5	V_{CC}	supply voltage

2.4、Function Table

Input	Output
A	**Y**
L	L
H	H

Note: H=HIGH voltage level; L=LOW voltage level;

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltage are referenced to GND (ground=0V), unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7.0	V
input voltage	V_I	-[1]	-0.5	+7.0	V
output voltage	V_O	output HIGH or LOW state[2][3]	-0.5	V_{CC}+0.5	V
		output in power-off state[2]	-0.5	+4.6	V
input clamping current	I_{IK}	V_I<0V	-20	-	mA
output clamping current	I_{OK}	V_O<0V or V_O>V_{CC}	-	±20	mA
output current	I_O	V_O=0V to V_{CC}	-	±25	mA
supply current	I_{CC}	-	-	50	mA
ground current	I_{GND}	-	-50	-	mA
storage temperature	T_{stg}	-	-65	+150	℃
total power dissipation	P_{tot}	-	-	250	mW
soldering temperature	T_L	10s	260		℃

Note:

[1] If the input current ratings are observed, the minimum input voltage ratings may be exceeded.

[2] If the output current ratings are observed, the output voltage ratings may be exceeded.

[3] This value is limited to 7V maximum.

3.2、Recommended Operating Conditions

(Voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.6	5.0	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	output HIGH or LOW state	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	℃
input transition rise and fall rate	Δt/ΔV	V_{CC}=1.8V to 5.0V	-	-	20	ns/V

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=1.65V to 1.8V		0.94	-	-	V
		V_{CC}=2.0V		0.99	-	-	V
		V_{CC}=2.25V to 2.5V		1.135	-	-	V
		V_{CC}=2.75V		1.21	-	-	V
		V_{CC}=3.0V to 3.3V		1.35	-	-	V
		V_{CC}=3.6V		1.47	-	-	V
		V_{CC}=4.5V to 5.0V		2.02	-	-	V
		V_{CC}=5.5V		2.10	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 2.0V		-	-	0.58	V
		V_{CC}=2.25V to 2.75V		-	-	0.75	V
		V_{CC}=3.0V to 3.6V		-	-	0.80	V
		V_{CC}=4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=-20uA	V_{CC} -0.1	-	-	V
			V_{CC}=1.65V; I_O=-2mA	1.28	-	-	V
			V_{CC}=1.8V; I_O=-2mA	1.5	-	-	V
			V_{CC}=2.3V; I_O=-2.3mA	2.0	-	-	V
			V_{CC}=2.3V; I_O=-3mA	2.0	-	-	V
			V_{CC}=2.5V; I_O=-3mA	2.25	-	-	V
			V_{CC}=3.0V; I_O=-3mA	2.78	-	-	V
			V_{CC}=3.0V; I_O=-5.5mA	2.6	-	-	V
			V_{CC}=3.3V; I_O=-5.5mA	2.9	-	-	V
			V_{CC}=4.5V; I_O=-4mA	4.2	-	-	V
			V_{CC}=4.5V; I_O=-8mA	4.1	-	-	V
			V_{CC}=5.0V; I_O=-8mA	4.6	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=20uA	-	-	0.1	V
			V_{CC}=1.65V; I_O=2mA	-	-	0.2	V
			V_{CC}=2.3V; I_O=2.3mA	-	-	0.1	V
			V_{CC}=2.3V; I_O=3mA	-	-	0.15	V
			V_{CC}=3.0V; I_O=3mA	-	-	0.1	V
			V_{CC}=3.0V; I_O=5.5mA	-	-	0.2	V
			V_{CC}=4.5V; I_O=4mA	-	-	0.15	V
			V_{CC}=4.5V; I_O=8mA	-	-	0.3	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=0V to 5.5V		-	-	±1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=1.8V, 2.5V, 3.3V, 5.0V		-	-	1	uA
additional supply current	ΔI_{CC}	per input pin; V_{CC}=1.8V; V_I=0.3V or 1.1V; I_O=0A; other pins at V_{CC} or GND		-	-	10	uA
		per input pin; V_{CC}=5.5V; V_I=0.3V or 3.4V; I_O=0A; other pins at V_{CC} or GND		-	-	1.35	mA

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=1.65V to 1.8V		1.0	-	-	V
		V_{CC}=2.0V		1.03	-	-	V
		V_{CC}=2.25V to 2.5V		1.18	-	-	V
		V_{CC}=2.75V		1.23	-	-	V
		V_{CC}=3.0V to 3.3V		1.37	-	-	V
		V_{CC}=3.6V		1.48	-	-	V
		V_{CC}=4.5V to 5.0V		2.03	-	-	V
		V_{CC}=5.5V		2.11	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 2.0V		-	-	0.55	V
		V_{CC}=2.25V to 2.75V		-	-	0.71	V
		V_{CC}=3.0V to 3.6V		-	-	0.65	V
		V_{CC}=4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=-20uA	V_{CC} -0.1	-	-	V
			V_{CC}=1.65V; I_O=-2mA	1.21	-	-	V
			V_{CC}=1.8V; I_O=-2mA	1.45	-	-	V
			V_{CC}=2.3V; I_O=-2.3mA	2.0	-	-	V
			V_{CC}=2.3V; I_O=-3mA	1.93	-	-	V
			V_{CC}=2.5V; I_O=-3mA	2.15	-	-	V
			V_{CC}=3.0V; I_O=-3mA	2.7	-	-	V
			V_{CC}=3.0V; I_O=-5.5mA	2.49	-	-	V
			V_{CC}=3.3V; I_O=-5.5mA	2.8	-	-	V
			V_{CC}=4.5V; I_O=-4mA	4.1	-	-	V
			V_{CC}=4.5V; I_O=-8mA	3.95	-	-	V
			V_{CC}=5.0V; I_O=-8mA	4.5	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=20uA	-	-	0.1	V
			V_{CC}=1.65V; I_O=2mA	-	-	0.25	V
			V_{CC}=2.3V; I_O=2.3mA	-	-	0.15	V
			V_{CC}=2.3V; I_O=3mA	-	-	0.2	V
			V_{CC}=3.0V; I_O=3mA	-	-	0.15	V
			V_{CC}=3.0V; I_O=5.5mA	-	-	0.252	V
			V_{CC}=4.5V; I_O=4mA	-	-	0.2	V
			V_{CC}=4.5V; I_O=8mA	-	-	0.35	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=0V to 5.5V		-	-	±1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=1.8V, 2.5V, 3.3V, 5.0V		-	-	10	uA
additional supply current	ΔI_{CC}	per input pin; V_{CC}=1.8V; V_I=0.3V or 1.1V; I_O=0A; other pins at V_{CC} or GND		-	-	10	uA
		per input pin; V_{CC}=5.5V; V_I=0.3V or 3.4V; I_O=0A; other pins at V_{CC} or GND		-	-	1.5	mA

3.3.3、DC Characteristics 3

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=1.65V to 1.8V		1.0	-	-	V
		V_{CC}=2.0V		1.03	-	-	V
		V_{CC}=2.25V to 2.5V		1.18	-	-	V
		V_{CC}=2.75V		1.23	-	-	V
		V_{CC}=3.0V to 3.3V		1.37	-	-	V
		V_{CC}=3.6V		1.48	-	-	V
		V_{CC}=4.5V to 5.0V		2.03	-	-	V
		V_{CC}=5.5V		2.11	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 2.0V		-	-	0.55	V
		V_{CC}=2.25V to 2.75V		-	-	0.71	V
		V_{CC}=3.0V to 3.6V		-	-	0.65	V
		V_{CC}=4.5V to 5.5V		-	-	0.80	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=-20uA	V_{CC} -0.1	-	-	V
			V_{CC}=1.65V; I_O=-2mA	1.21	-	-	V
			V_{CC}=1.8V; I_O=-2mA	1.45	-	-	V
			V_{CC}=2.3V; I_O=-2.3mA	2.0	-	-	V
			V_{CC}=2.3V; I_O=-3mA	1.93	-	-	V
			V_{CC}=2.5V; I_O=-3mA	2.15	-	-	V
			V_{CC}=3.0V; I_O=-3mA	2.7	-	-	V
			V_{CC}=3.0V; I_O=-5.5mA	2.49	-	-	V
			V_{CC}=3.3V; I_O=-5.5mA	2.8	-	-	V
			V_{CC}=4.5V; I_O=-4mA	4.1	-	-	V
			V_{CC}=4.5V; I_O=-8mA	3.95	-	-	V
			V_{CC}=5.0V; I_O=-8mA	4.5	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	V_{CC}=1.65V to 5.5V; I_O=20uA	-	-	0.1	V
			V_{CC}=1.65V; I_O=2mA	-	-	0.25	V
			V_{CC}=2.3V; I_O=2.3mA	-	-	0.15	V
			V_{CC}=2.3V; I_O=3mA	-	-	0.2	V
			V_{CC}=3.0V; I_O=3mA	-	-	0.15	V
			V_{CC}=3.0V; I_O=5.5mA	-	-	0.252	V
			V_{CC}=4.5V; I_O=4mA	-	-	0.2	V
			V_{CC}=4.5V; I_O=8mA	-	-	0.35	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=0V to 5.5V		-	-	±1	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=1.8V, 2.5V, 3.3V, 5.0V		-	-	10	uA
additional supply current	ΔI_{CC}	per input pin; V_{CC}=1.8V; V_I=0.3V or 1.1V; I_O=0A; other pins at V_{CC} or GND		-	-	10	uA
		per input pin; V_{CC}=5.5V; V_I=0.3V or 3.4V; I_O=0A; other pins at V_{CC} or GND		-	-	1.5	mA

3.3.4、AC Characteristics 1

(T_{amb}=25℃, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5[1]	V_{CC}=1.8V; C_L=15pF	-	12.6	18.8	ns
			V_{CC}=1.8V; C_L=30pF	-	14.8	21	ns
			V_{CC}=2.5V; C_L=15pF	-	9	12.8	ns
			V_{CC}=2.5V; C_L=30pF	-	10.6	14.4	ns
			V_{CC}=3.3V; C_L=15pF	-	7.4	10.4	ns
			V_{CC}=3.3V; C_L=30pF	-	8.6	11.8	ns
			V_{CC}=5.0V; C_L=15pF	-	6.2	7.8	ns
			V_{CC}=5.0V; C_L=30pF	-	7.2	9	ns
input capacitance	C_I	V_I=V_{CC} or GND; V_{CC}=3.3V		-	1.5	10	pF
output capacitance	C_O	V_O=V_{CC} or GND; V_{CC}=3.3V		-	2.5	-	pF
power dissipation capacitance	C_{PD}	per buffer; V_I=GND to V_{CC}; C_L=30pF; f=10MHz[2]	V_{CC}=1.8V	-	4.2	-	pF
			V_{CC}=2.5V	-	5.5	-	pF
			V_{CC}=3.3V	-	7.4	-	pF
			V_{CC}=5.0V	-	11.5	-	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\sum(C_L\times V_{CC}^2\times f_o)$ where:

f_i=input frequency in MHz;

f_o=output frequency in MHz;

C_L=output load capacitance in pF;

V_{CC}=supply voltage in V; N=number of inputs switching; $\sum(C_L\times V_{CC}^2\times f_o)$=sum of the outputs.

3.3.5、AC Characteristics 2

(T_{amb}=-40℃ to +85℃, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5[1]	V_{CC}=1.8V; C_L=15pF	-	-	21.2	ns
			V_{CC}=1.8V; C_L=30pF	-	-	24	ns
			V_{CC}=2.5V; C_L=15pF	-	-	14.4	ns
			V_{CC}=2.5V; C_L=30pF	-	-	16.4	ns
			V_{CC}=3.3V; C_L=15pF	-	-	11.8	ns
			V_{CC}=3.3V; C_L=30pF	-	-	13.6	ns
			V_{CC}=5.0V; C_L=15pF	-	-	8.6	ns
			V_{CC}=5.0V; C_L=30pF	-	-	9.8	ns
input capacitance	C_I	V_I=V_{CC} or GND; V_{CC}=3.3V		-	-	10	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

3.3.6、AC Characteristics 3

(T_{amb}=-40℃ to +125℃, GND=0V, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	A, B to Y; see Figure 5[1]	V_{CC}=1.8V; C_L=15pF	-	-	22.8	ns
			V_{CC}=1.8V; C_L=30pF	-	-	25.6	ns
			V_{CC}=2.5V; C_L=15pF	-	-	15.6	ns
			V_{CC}=2.5V; C_L=30pF	-	-	17.8	ns
			V_{CC}=3.3V; C_L=15pF	-	-	12.6	ns
			V_{CC}=3.3V; C_L=30pF	-	-	14.2	ns
			V_{CC}=5.0V; C_L=15pF	-	-	9	ns
			V_{CC}=5.0V; C_L=30pF	-	-	10.4	ns
input capacitance	C_I	V_I=V_{CC} or GND; V_{CC}=3.3V		-	-	10	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

4、Testing Circuit

4.1、AC Testing Circuit

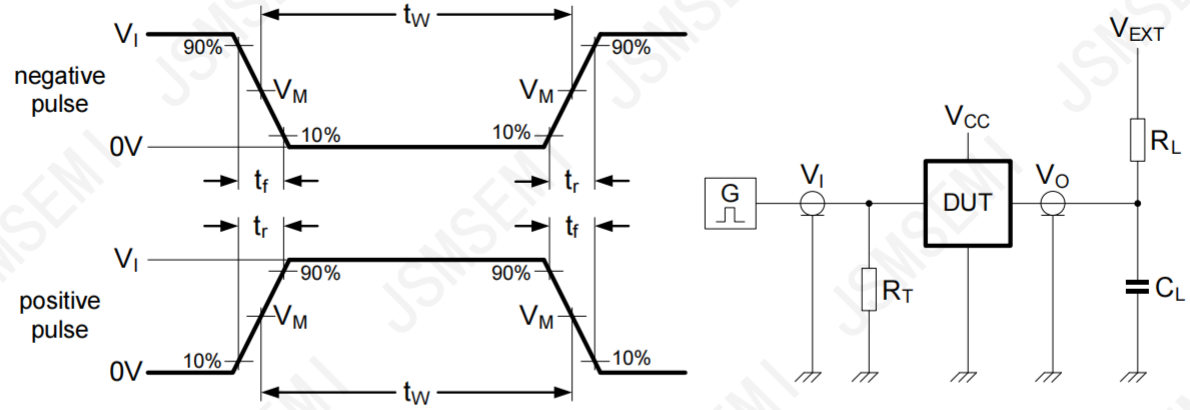


Figure 4. Test circuit for measuring switching time

Definitions test circuit:

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

C_L=Load capacitance including jig and probe capacitance

R_L=Load resistance

V_{EXT}=External voltage for measuring switching times

4.2、AC Testing Waveforms

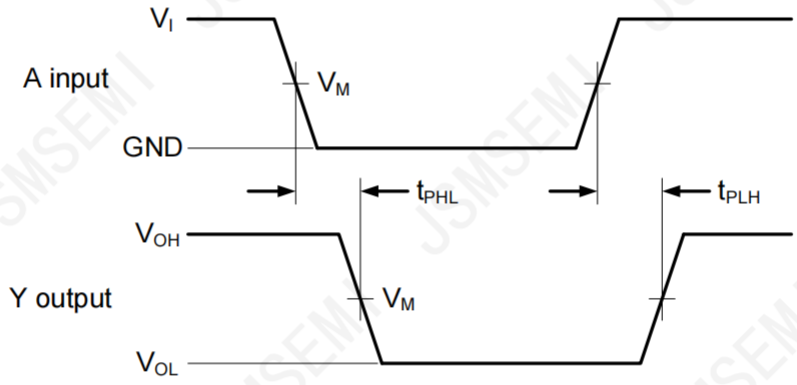


Figure 5. The input A to output Y propagation delays

4.3、Measurement Points

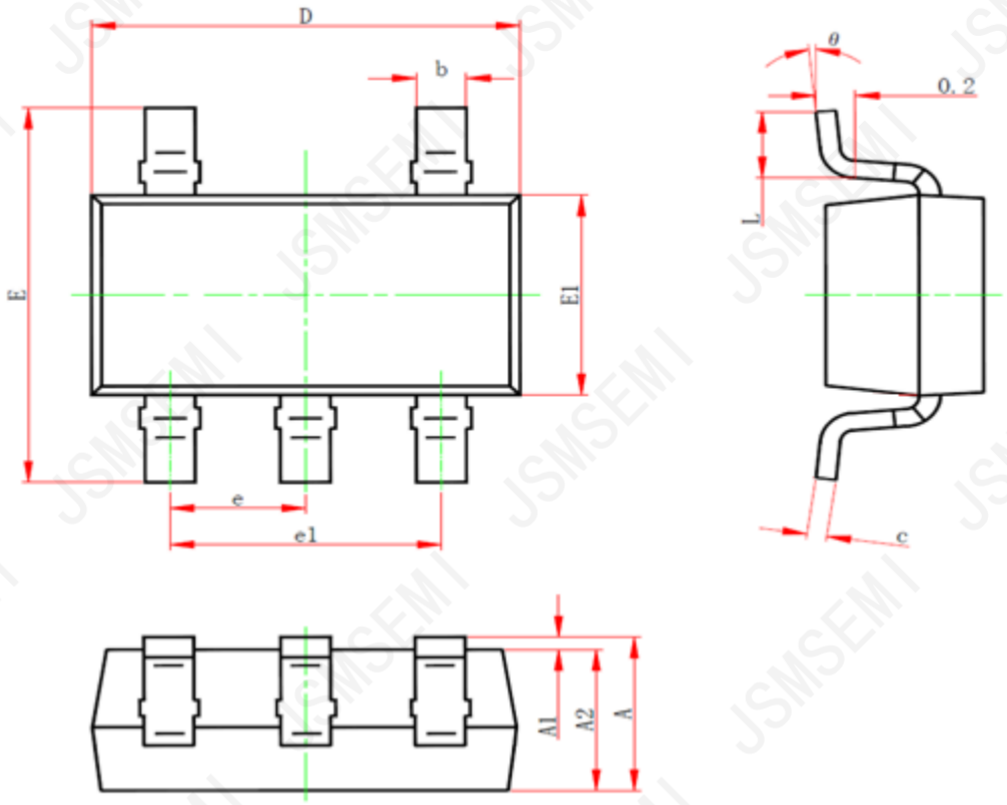
Input	Output
V_M	V_M
$0.5V_I$	$0.5V_{CC}$

4.4、Test Data

Supply voltage	Input			Load		V_{EXT}		
V_{CC}	V_I	$\Delta t/\Delta V$[1]	f_{max}	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.8V	V_{CC}	≤1.0ns/V	15MHz	15pF, 30pF	1MΩ	GND	GND	V_{CC}
2.5V	V_{CC}	≤1.0ns/V	25MHz	15pF, 30pF	1MΩ	GND	GND	V_{CC}
3.3V	3V	≤1.0ns/V	50MHz	15pF, 30pF	1MΩ	GND	GND	V_{CC}
5.0V	3V	≤1.0ns/V	50MHz	15pF, 30pF	1MΩ	GND	GND	V_{CC}

5、Package Information

5.1、TSSOP-5



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.26
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°

6、Statements And Notes

6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

Revision History

Rev.	Change	Date
V1.0	Initial version	2/23/2024

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