

Features

- Operate from 1.6V to 5.5V
- Low Power Current: $I_{CC}=10\mu A$ (Max.)
- $\pm 8mA$ Output Drive ($V_{CC}=5.0V$)
- Power Down Protection
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

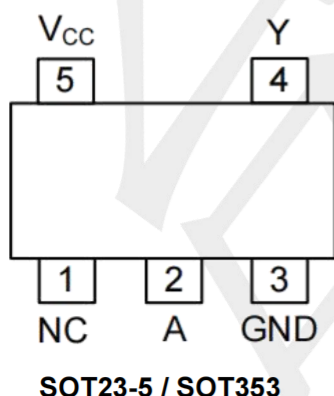
General Description

The is a single, level translating inverter gate. 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.

Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
SN74LV1T04DBVR-TP	SOT23-5	Tape and Reel,3000
SN74LV1T04DCKR-TP	SOT353	Tape and Reel,3000

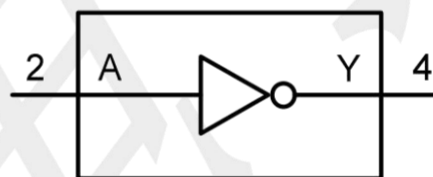
Pin Configuratio



Applications

- AV Receiver
- Audio Dock:Portable
- Blu-ray Player and Home Theater
- Embedded PC
- Personal Digital Assistant(PDA)
- Power:Telecom/Server AC/DC Supply:Single Controller:Analog and Digital
- Solid State Drive(SSD):Client and Enterprise
- Wireless Headset,Keyboard,and Mouse

Logic Diagram



Logic Symbol

Function Table

INPUT (Lower Level Input)	OUTPUT (V_{CC} CMOS)
A	Y
H	L
L	H

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

Absolute Maximum Ratings

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ 7	V
Input Voltage (Note 2)	V_{IN}		-0.5 ~ 7	V
Output Voltage (Note 2)	V_{OUT}	Output in the high-impedance or power-off state	-0.5 ~ 4.6	V
		Output in the high or low state	-0.5 ~ $V_{CC}+0.5$	V
Continuous Output Current	I_{OUT}		± 25	mA
Continuous current through		V_{CC} or GND	± 50	mA
Input Clamp Current	I_{IK}	$V_{IN} < 0$	-20	mA
Output Clamp Current	I_{OK}	$V_{OUT} < 0$ or $V_{OUT} > V_{CC}$	± 20	mA
Storage Temperature Range	T_{STG}		-65 ~ +150	°C

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.6	--	5.5	V
Input Voltage	V_{IN}		0	--	5.5	V
Output Voltage	V_{OUT}		0	--	V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t / \Delta v$	$V_{CC}=1.8V$	--	--	20	ns/V
		$V_{CC}=3.3V$ or $2.5V$	--	--	20	ns/V
		$V_{CC}=5V$	--	--	20	ns/V
Operating Temperature	T_A		-40	--	+125	°C

STATIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V _{IH}	V _{CC} = 1.65V~1.8V	0.94	--	--	V
		V _{CC} = 2.0V	1.02	--	--	V
		V _{CC} = 2.25V~2.5V	1.135	--	--	V
		V _{CC} = 2.75V	1.21	--	--	V
		V _{CC} = 3.0V~3.3V	1.35	--	--	V
		V _{CC} = 3.6V	1.47	--	--	V
		V _{CC} = 4.5V~5.0V	2.25	--	--	V
		V _{CC} = 5.5V	2.5	--	--	V
Low-Level Input Voltage	V _{IL}	V _{CC} = 1.65V~2V	--	--	0.58	V
		V _{CC} = 2.25V~2.75V	--	--	0.75	V
		V _{CC} = 3V~3.6V	--	--	0.8	V
		V _{CC} = 4.5V~5.5V	--	--	0.8	V
High-Level Output Voltage	V _{OH}	V _{CC} = 1.65V ~ 5.5V, I _{OH} = -20μA	V _{CC} -0.1	--	--	V
		V _{CC} = 1.65V	I _{OH} = -2mA	1.28	--	V
		V _{CC} = 1.8V				
		V _{CC} = 2.3V	I _{OH} = -2.3mA	2	--	V
		V _{CC} = 2.5V, I _{OH} = -3mA	2.25	--	--	V
		V _{CC} = 3V	I _{OH} = -3mA	2.78	--	V
			I _{OH} = -5.5mA	2.6	--	V
		V _{CC} = 3.3V, I _{OH} = -5.5mA				
		V _{CC} = 4.5V	I _{OH} = -4mA	4.2	--	V
			I _{OH} = -8mA	4.1	--	V
		V _{CC} = 5V, I _{OH} = -8mA				
Low-Level Output Voltage	V _{OL}	V _{CC} = 1.65V ~ 5.5V, I _{OL} = 20μA	--	--	0.1	V
		V _{CC} = 1.65V, I _{OL} = 1.9mA	--	--	0.2	V
		V _{CC} = 2.3V	I _{OL} = 2.3mA	--	--	0.1
			I _{OL} = 3mA	--	--	0.15
		V _{CC} = 3V				
			I _{OL} = 5.5mA	--	--	0.2
		V _{CC} = 4.5V				
			I _{OL} = 4mA	--	--	0.15
			I _{OL} = 8mA	--	--	0.3

STATIC CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC} = 0V, 1.8V, 2.5V, 3.3V, 5.5V, V_{IN} = 0V \text{ or } V_{CC}$	--	--	0.12	μA
Quiescent Supply Current	I_Q	$V_{CC} = 1.8V, 2.5V, 3.3V, 5V, V_{IN} = 0V \text{ or } V_{CC}, I_O = 0$; Open on loading	--	--	1	μA
Additional Quiescent Supply Current	I_Q	$V_{CC} = 5.5V$, one input at 0.3V or 3.4V, other inputs at 0 or V_{CC} , $I_O = 0$	--	--	1.35	mA
		$V_{CC} = 1.8V$, one input at 0.3V or 1.1V, other inputs at 0 or V_{CC} , $I_O = 0$	--	--	10	μA
Input Capacitance	C_{IN}	$V_{CC} = 3.3V, V_{IN} = V_{CC} \text{ or } GND$	--	2	--	pF
Output Capacitance	C_{OUT}	$V_{CC} = 3.3V, V_{OUT} = V_{CC} \text{ or } GND$	--	2.5	--	pF

OPERATING CHARACTERISTICS

($f = 1MHz \text{ \& } 10MHz, T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC} = 1.8V \pm 0.15V$	--	10	--	pF
		$V_{CC} = 2.5V \pm 0.2V$	--	10	--	pF
		$V_{CC} = 3.3V \pm 0.3V$	--	10	--	pF
		$V_{CC} = 5.0V \pm 0.5V$	--	10	--	pF

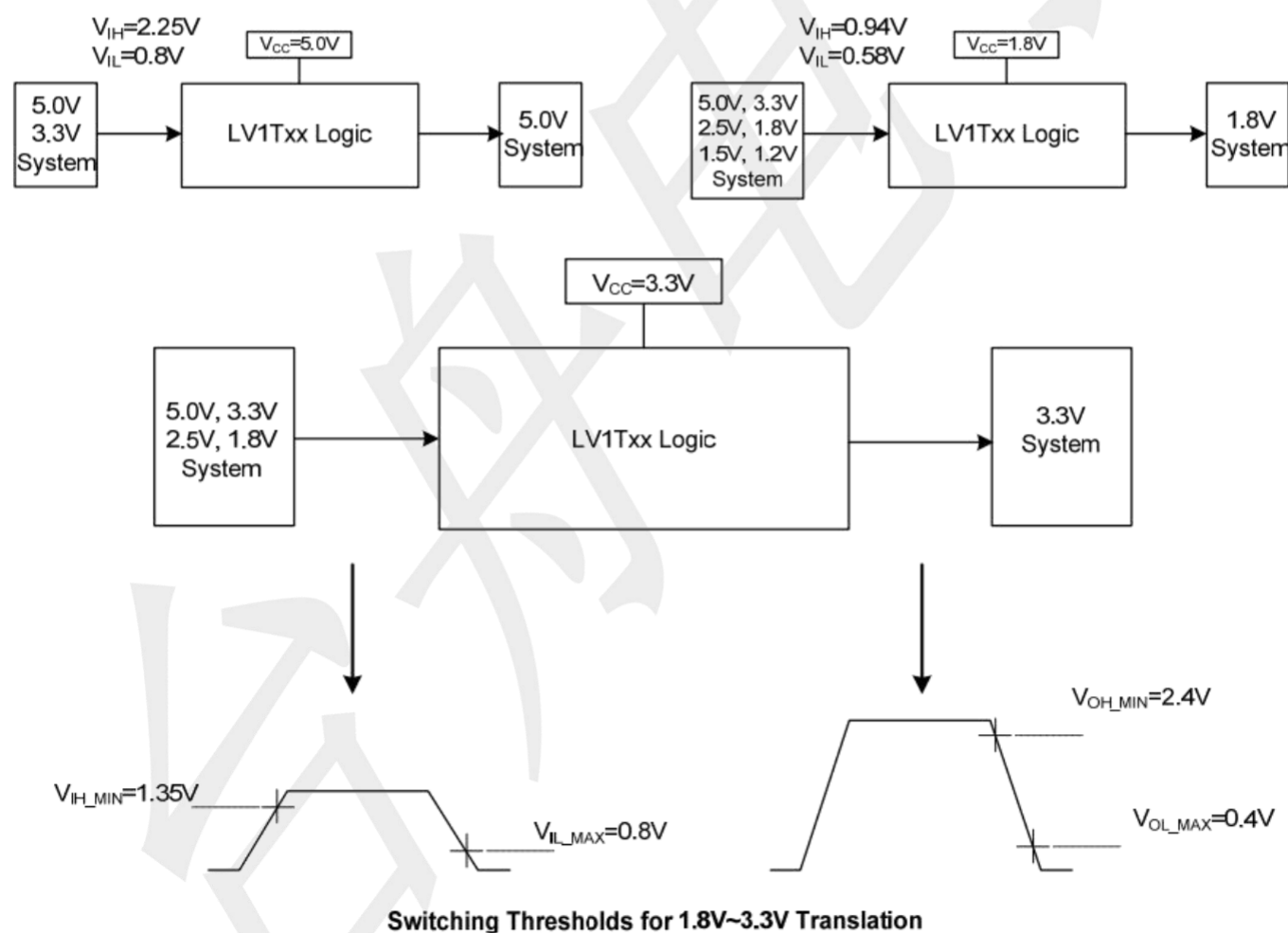
DYNAMIC CHARACTERISTICS ($T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation delay from input (Any I_{IN}) to output(Y)	t_{PLH}/t_{PHL}	$C_L = 15pF$	$V_{CC} = 1.8V$	--	10.5	11	ns
			$V_{CC} = 2.5V$	--	6.0	6.5	ns
			$V_{CC} = 3.3V$	--	4.8	6.0	ns
			$V_{CC} = 5V$	--	4.0	6.0	ns
		$C_L = 30pF$	$V_{CC} = 1.8V$	--	12	13	ns
			$V_{CC} = 2.5V$	--	6.5	7.5	ns
			$V_{CC} = 3.3V$	--	5.5	7.0	ns
			$V_{CC} = 5V$	--	5.0	7.0	ns

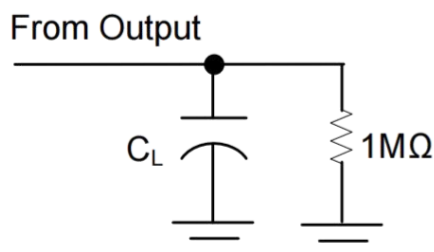
THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-25	θ_{JA}	230	$^{\circ}\text{C/W}$
	SOT-353		350	$^{\circ}\text{C/W}$

TYPICAL DESIGN EXAMPLES

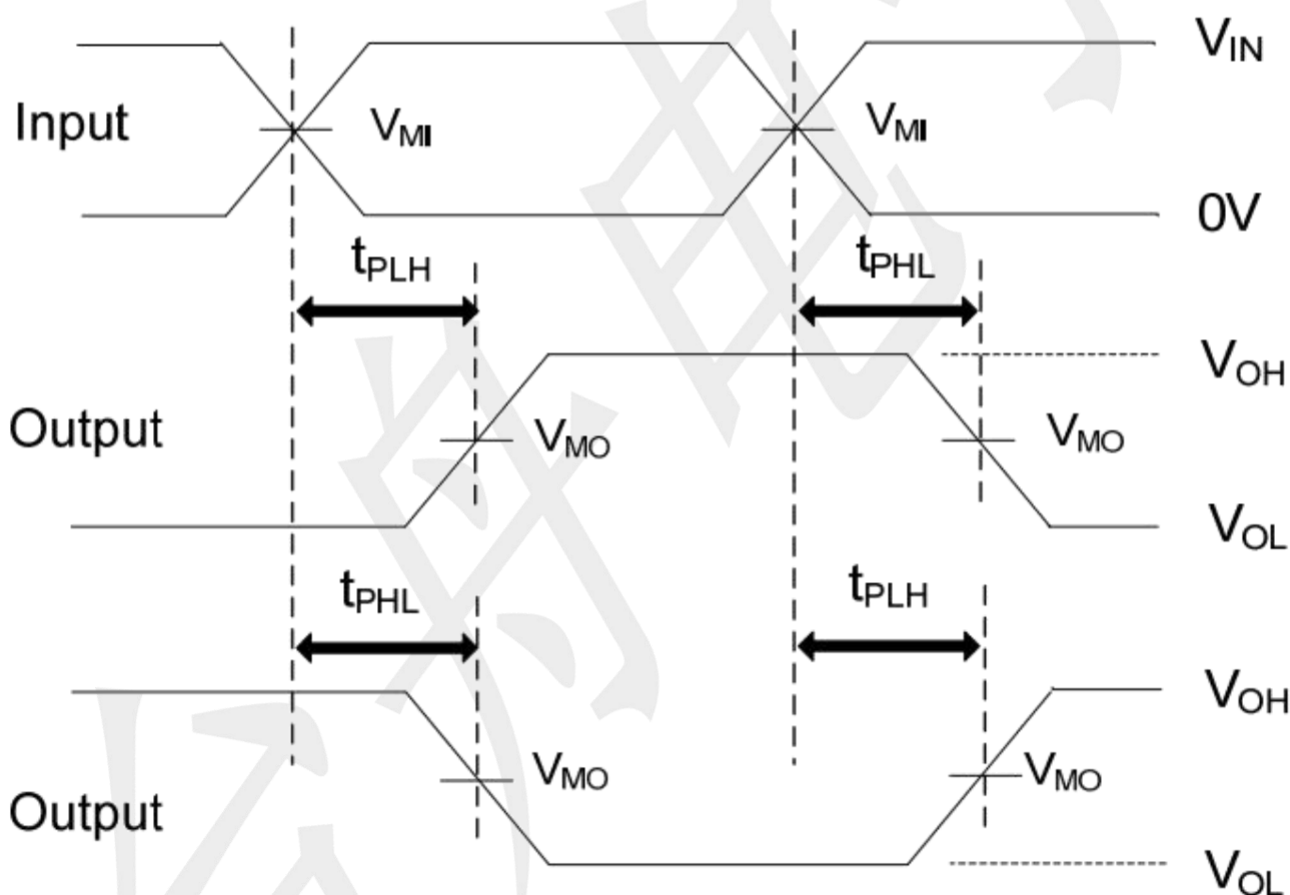


TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

	$V_{CC}=2.5V\pm0.2V$	$V_{CC}=3.3V\pm0.3V$
C_L	5, 10, 15, 30pF	5, 10, 15, 30pF
V_{MI}	$V_I/2$	$V_I/2$
V_{MO}	$V_{CC}/2$	$V_{CC}/2$

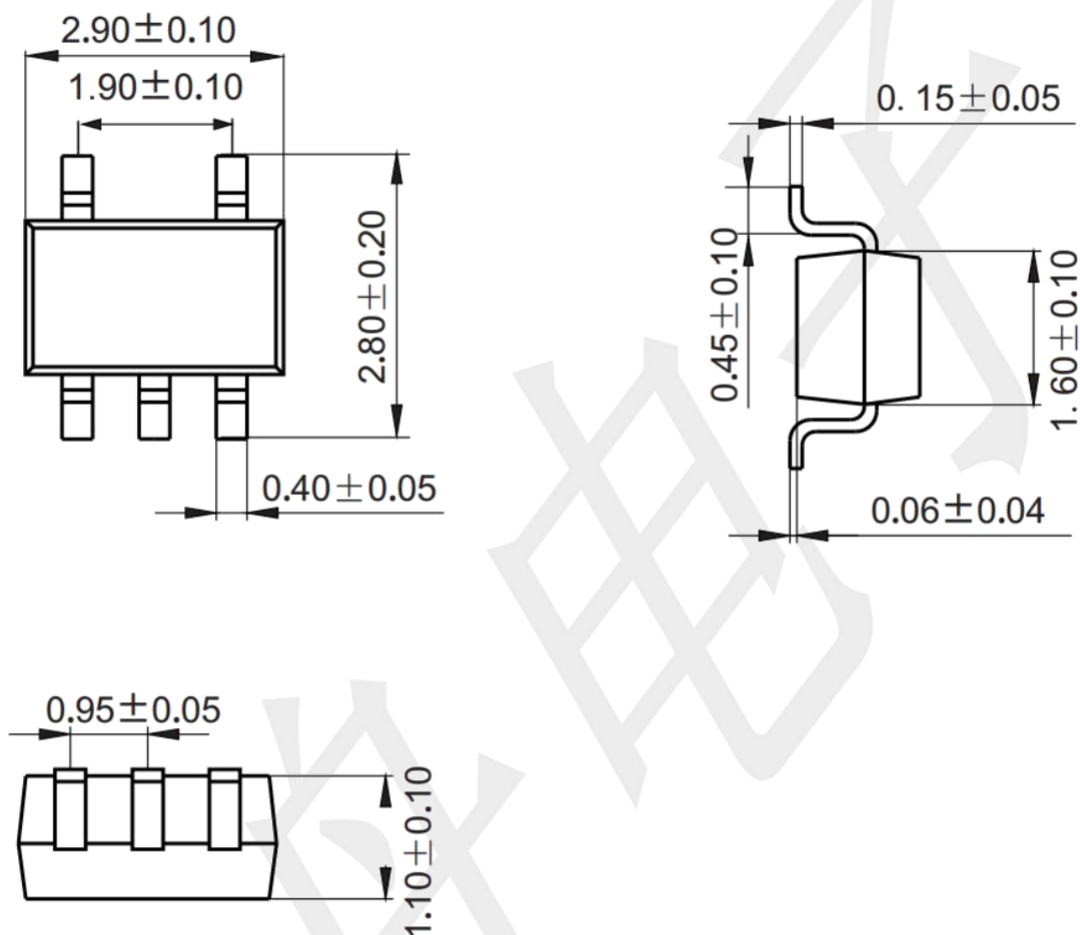


Notes:

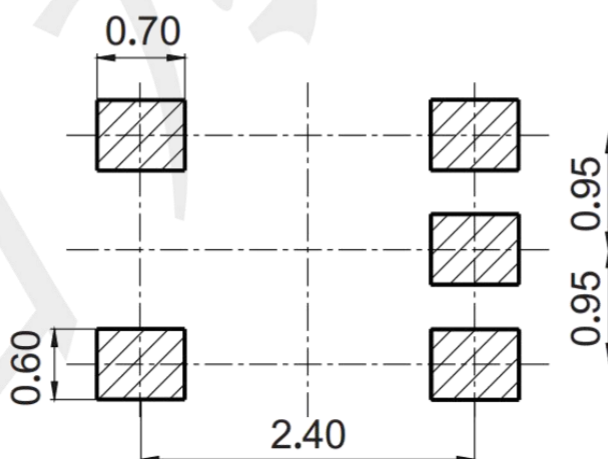
1. C_L includes probe and jig capacitance
2. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{MHz}$, $Z_O=50\Omega$, slew rate $\geq 1\text{V/ns}$.
3. The outputs are measured one at a time, with one transition per measurement.
4. t_{PLH} and t_{PHL} are the same as t_{PD} .

Package information (Unit: mm)

SOT23-5

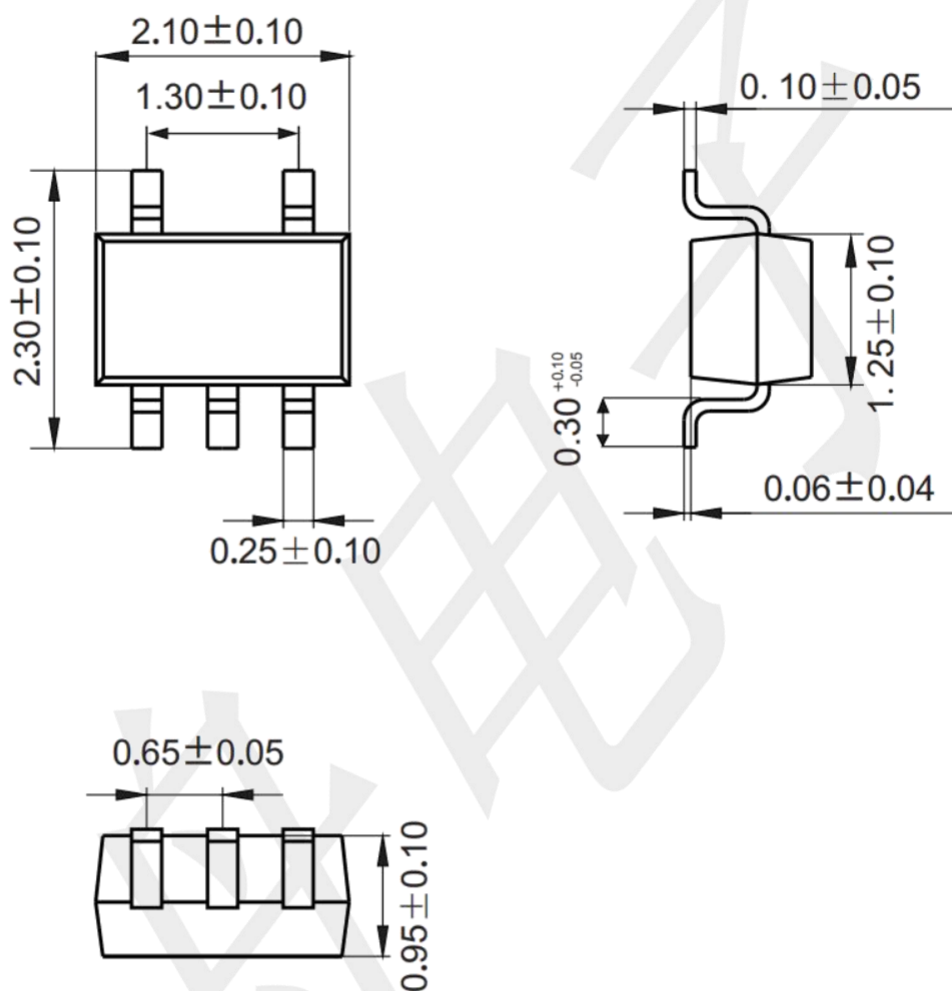


Mounting Pad Layout (unit: mm)



Package information (Unit: mm)

SOT353



Mounting Pad Layout (unit: mm)

