Quadruple Bus Buffer Gate With 3-State Outputs

General Description

The ET74LVC125A is a quad buffer/line driver with 3-state outputs controlled by the output enable inputs ($n\overline{OE}$). A HIGH on $n\overline{OE}$ causes the outputs to assume a high impedance OFF-state.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

Features

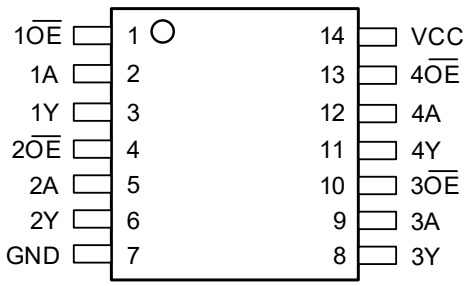
- Wide Operating Voltage Range: 1.65V to 5.5V
- ±24mA Balanced Output Sink and Source Capability
- ESD Protection Complies with JESD22 Standard
  -- HBM: ±4000V Pass (JEDEC JS-001)
  -- CDM: ±1000V Pass (JEDEC JS-002)
- Latch-up Performance Exceeds ±200mA per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	MSL
ET74LVC125AM14	SOP14 (8.65mm × 3.9mm)	3
ET74LVC125AV	TSSOP14 (5.0mm × 4.4mm)	3
ET74LVC125AY	QFN14 (3.0mm × 2.5mm)	3

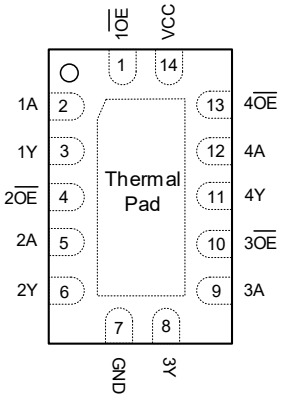
Applications

- Mobile Device
- Telecom Equipment
- Industrial Equipment

Pin Configuration



SOP14/TSSOP14



QFN14

Figure1. Pin Configuration

Pin Function

Pin		I/O	Description
Name	No.		
1 $\overline{OE}$	1	Input	Channel 1, Output Enable
1A	2	Input	Channel 1, Input A
1Y	3	Output	Channel 1, Output Y
2 $\overline{OE}$	4	Input	Channel 2, Output Enable
2A	5	Input	Channel 2, Input A
2Y	6	Output	Channel 2, Output Y
GND	7	--	Ground
3Y	8	Output	Channel 3, Output Y
3A	9	Input	Channel 3, Input A
3 $\overline{OE}$	10	Input	Channel 3, Output Enable
4Y	11	Output	Channel 4, Output Y
4A	12	Input	Channel 4, Input A
4 $\overline{OE}$	13	Input	Channel 4, Output Enable
V_{CC}	14	--	Positive Supply

Block Diagram

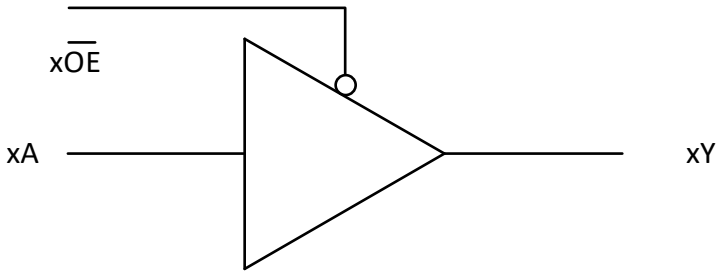


Figure2. Logic Symbol

Function Table

Input		Output
x $\overline{OE}$	xA	xY
L	L	L
L	H	H
H	X	Z

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage (VCC Pin)		-0.5 to 6.5	V
V_I	Input Voltage		-0.5 to 6.5	V
V_O	Output Voltage		-0.5 to V_{CC} + 0.5	V
I_{IK}	Input Clamp Current (1)	V_I < -0.5V	-50	mA
I_{OK}	Output Clamp Current (1)	V_O < -0.5V	-50	mA
I_O	Continuous Output Current	V_O > -0.5V or V_O < V_{CC} + 0.5V	±50	mA
I_{CC}	Continuous Current Through V_{CC} or GND		±100	mA
T_J	Max Junction Temperature		150	°C
T_{LEAD}	Lead Temperature (Soldering 10s)		300	°C
T_{STG}	Storage Temperature		-65 to 150	°C
V_{ESD}	Human Body Model (2)		±4000	V
	Charged Device Model (3)		±1000	
I_{LU}	Max Latch Up Current Above V_{CC} and GND at 125°C (4)		±200	mA

Note1: I_{IK} & I_{OK} absolute maximum rating must be observed.

Note2: HBM tested per JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch up Current Maximum Rating tested per JEDEC JESD78F.

Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	Operating	1.65	5.5	V
		Functional	1.2		V
V_I	Input Voltage		0	V_{CC}	V
V_O	Output Voltage	Output Active State	0	V_{CC}	V
		Output 3-State	0	V_{CC}	
T_A	Ambient Temperature		-40	125	°C
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 2.3V to 2.7V		20	ns/V
		V_{CC} = 2.7V to 3.6V		10	ns/V

Electrical Characteristics

DC Electrical Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Condition		V_{CC} (V)	Operating Free-air Temperature (T_A)						Unit
					T_A = 25°C		T_A = -40°C~85°C		T_A = -40°C~125°C		
					Min	Max	Min	Max	Min	Max	
V_{IH}	High-level Input Voltage			1.2	1.08		1.08		1.08		
				1.65~1.95	0.65 V_{CC}		0.65 V_{CC}		0.65 V_{CC}		
				2.3~2.7	1.7		1.7		1.7		
				2.7~3.6	2		2		2		
				4.5~5.5	2		2		2		
V_{IL}	Low-level Input Voltage			1.2		0.12		0.12		0.12	
				1.65~1.95		0.35 V_{CC}		0.35 V_{CC}		0.35 V_{CC}	
				2.3~2.7		0.7		0.7		0.7	
				2.7~3.6		0.8		0.8		0.8	
				4.5~5.5		0.8		0.8		0.8	
V_{OH}	High−level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} = -100μA	1.65~5.5	V_{CC} - 0.2		V_{CC} - 0.2		V_{CC} - 0.2		V
			I_{OH} = -4mA	1.65	1.29		1.2		1.05		
			I_{OH} = -8mA	2.3	1.9		1.7		1.55		
			I_{OH} = -12mA	2.7	2.2		2.2		2.05		
				3	2.4		2.4		2.25		
			I_{OH} = -24mA	3	2.3		2.2		2		
				5.5	4.8		4.7		4.5		
V_{OL}	Low−level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OL} = 100μA	1.65~5.5		0.1		0.2		0.3	V
			I_{OL} = 4mA	1.65		0.24		0.45		0.6	
			I_{OL} = 8mA	2.3		0.3		0.6		0.75	
			I_{OL} = 12mA	2.7		0.4		0.4		0.6	
			I_{OL} = 24mA	3		0.55		0.55		0.8	
				3		0.55		0.55		0.8	

DC Electrical Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Condition		V_{CC} (V)	Operating Free-air Temperature (T_A)						Unit
					T_A = 25°C		T_A = -40°C~85°C		T_A = -40°C~125°C		
					Min	Max	Min	Max	Min	Max	
I_I	Input Leakage Current	V_I = V_{CC} or GND		5.5	5.5	±0.1		±5		±20	μA
I_{OZ}	OFF-state Output Current	V_O = V_{CC} or GND		5.5		±0.1		±10		±20	μA
I_{CC}	Supply Current	V_I = V_{CC} or GND	I_O = 0mA	5.5		0.1		10		40	μA
ΔI_{CC}	Additional Supply Current	One Input at V_{CC} - 0.6V, Other Inputs at V_{CC} or GND		1.65~5.5		5		500		5000	μA
C_I	Input Capacitance	V_I = V_{CC} or GND		5.5		5					pF

Electrical Characteristics(Continued)

Switching Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

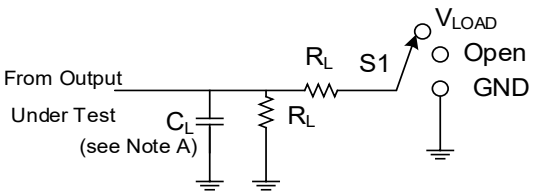
Symbol	Parameter	From	To	V_{CC}(V)	Operating Free-air Temperature (T_A)							Unit
					T_A = 25°C			T_A = -40°C~85°C		T_A = -40°C~125°C		
					Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	Propagation Delay	xA	Y	1.8 ± 0.15	1	7	17	1	21	1	21	ns
				2.5 ± 0.2	1	4	12	1	15	1	15	
				2.7	1	4	7.5	1	9	1	9.5	
				3.3 ± 0.3	1	3.2	5	1	6	1	6.5	
				5 ± 0.5		2.4	4.5		5		5.5	
t_{en}	Propagation Delay	x $\overline{OE}$	Y	1.8 ± 0.15	1	10	20	1	26	1	26	ns
				2.5 ± 0.2	1	5	15	1	17	1	17	
				2.7	1	6	7.5	1	9	1	9.5	
				3.3 ± 0.3	1	4.1	6	1	6	1	6.5	
				5 ± 0.5		3.4	4.5		5		5.5	
t_{dis}	Propagation Delay	x $\overline{OE}$	Y	1.8 ± 0.15	1	4	13	1	15	1	15.5	ns
				2.5 ± 0.2	1	1.6	7.5	1	8	1	8.5	
				2.7	1	2.5	7.5	1	9	1	9.5	
				3.3 ± 0.3	1	2.1	5	1	6	1	6.5	
				5 ± 0.5		0.9	4.5		5		5.5	
$T_{sk(o)}$				3.3 ± 0.3					1		1	ns

Operating Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

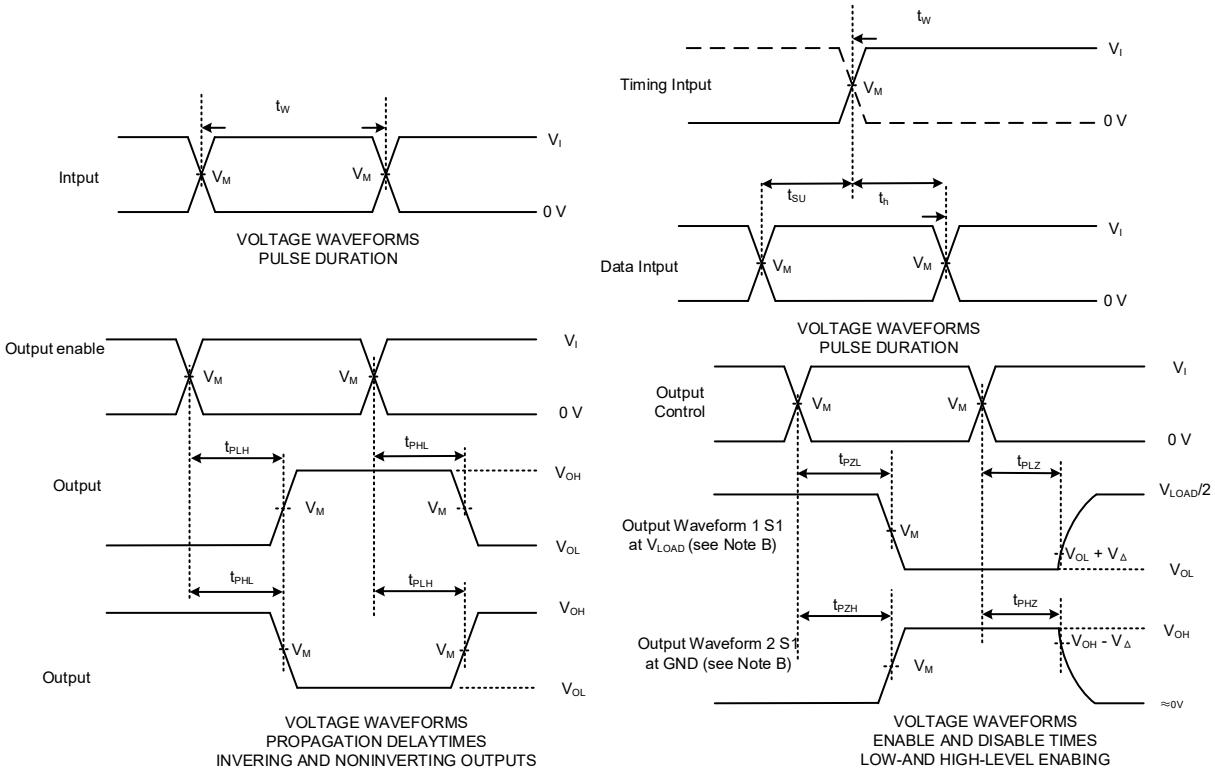
Symbol	Parameter	Condition	V_{CC}(V)	Typ	Unit
C_{PD}	Power Dissipation Capacitance Gate	No Load	1.8	7	pF
			2.5	7	pF
			3.3	8	pF
			5.5	8	pF

Parameter Measurement Information



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

Figure3. Test circuit for measuring switching times



Notes:

A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.

C. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

D. All input pulses are supplied by generators having the following characteristics:

PRR ≤ 10MHz, Z_O = 50Ω

E. The outputs are measured one at a time, with one transition per measurement.

F. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

G. t_{PZL} and t_{PZH} are the same as t_{en}.

H. t_{PLH} and t_{PHL} are the same as t_{pd}.

I. All parameters and waveforms are not applicable to all devices.

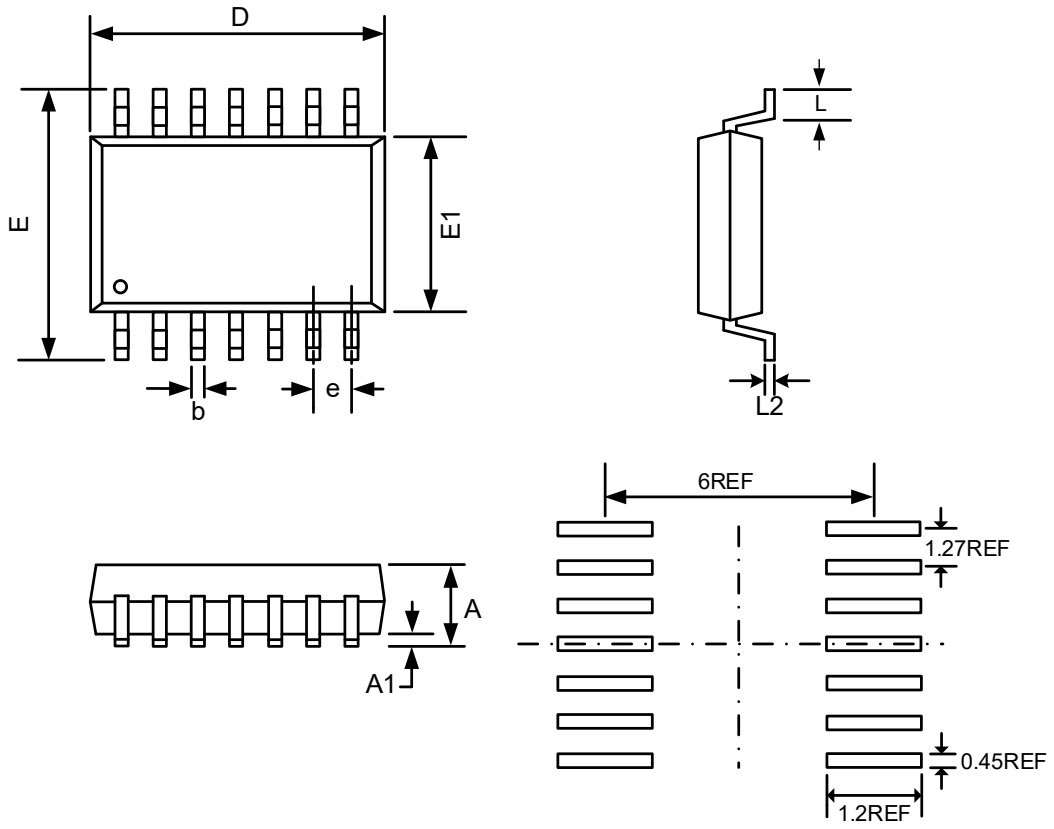
Figure.4 Input to output propagation delay times

Table1. Test Data

V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
1.8V ± 0.15V	V_{CC}	≤ 2ns	V_{CC} / 2	2 × V_{CC}	30pF	1kΩ	0.15V
2.5V ± 0.2V	V_{CC}	≤ 2ns	V_{CC} / 2	2 × V_{CC}	30pF	500Ω	0.15V
2.7V	2.7V	≤ 2.5ns	1.5V	6V	50pF	500Ω	0.3V
3.3V ± 0.3V	2.7V	≤ 2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V ± 0.5V	V_{CC}	≤ 2.5ns	V_{CC} / 2	2 × V_{CC}	50pF	500Ω	0.3V

Package Dimension

SOP14 (8.65mm × 3.9mm)

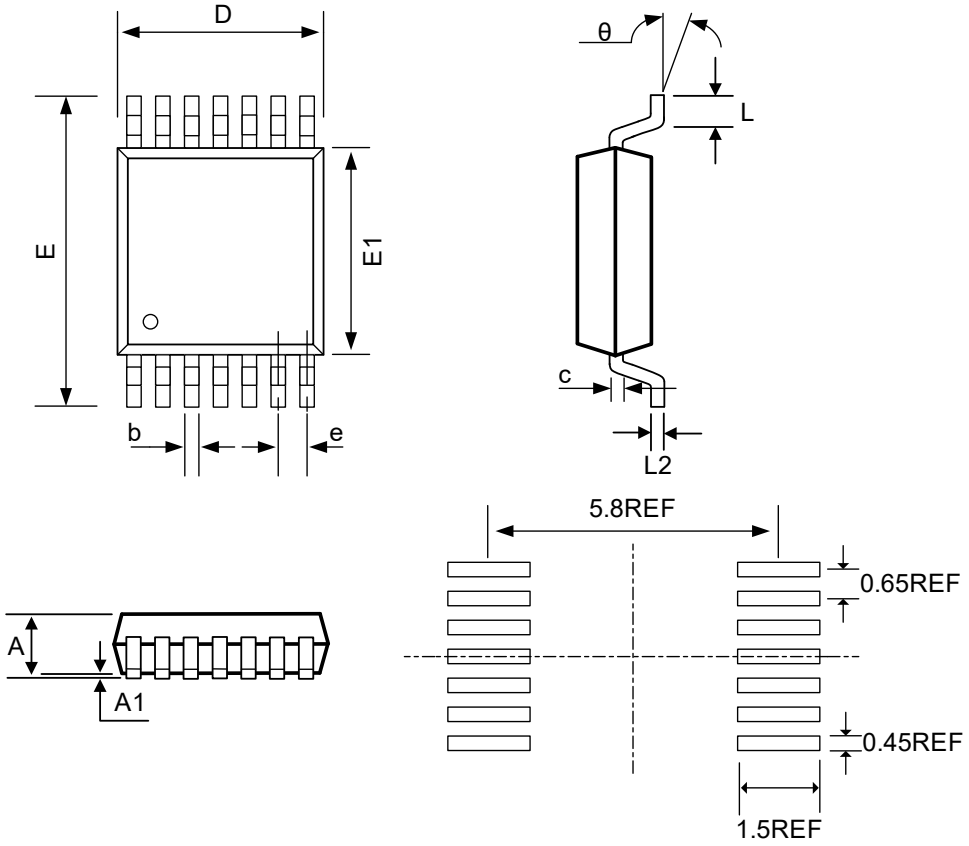


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	MAX
A	--	1.75
A1	0.10	0.25
b	0.36	0.51
D	8.55	8.75
E	5.80	6.20
E1	3.80	4.00
e	1.22	1.32
L	0.45	0.75
L2	0.25 BSC	

TSSOP14 (5.0mm × 4.4mm)

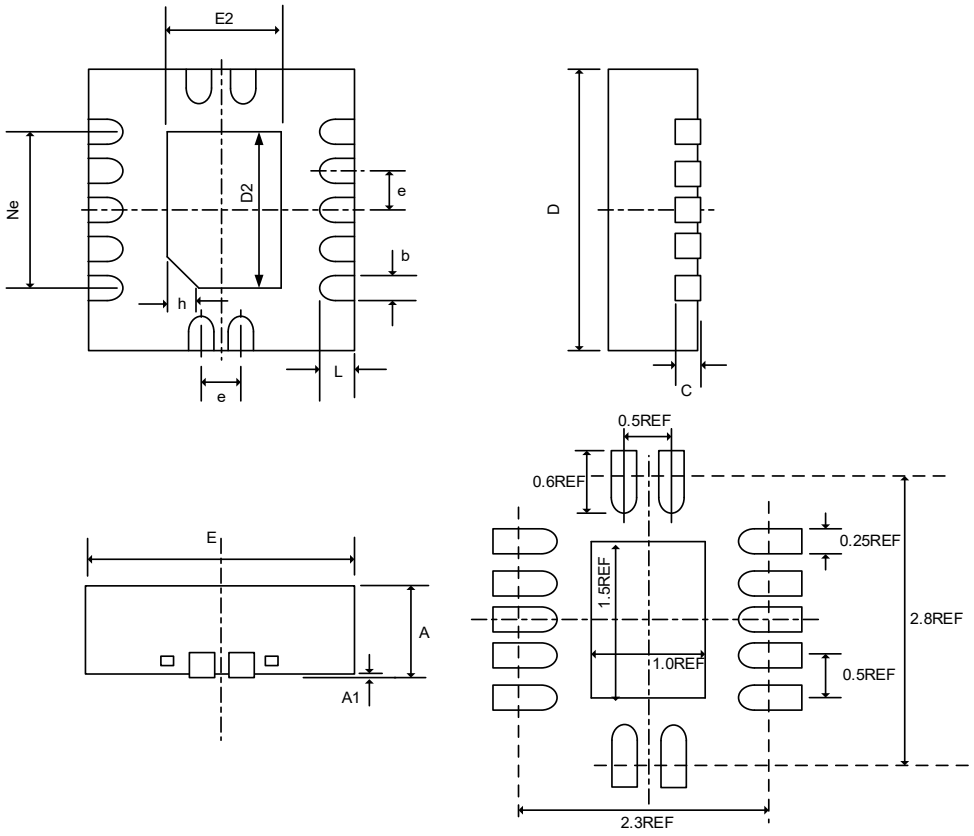


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	MAX
A	--	1.20
A1	0.05	0.15
b	0.19	0.30
c	0.15 REF	
D	4.90	5.10
E	6.20	6.60
E1	4.30	4.50
e	0.65BSC	
L	0.50	0.72
L2	0.25 REF	
θ	0°	8°

QFN14 (3.0mm × 2.5mm)



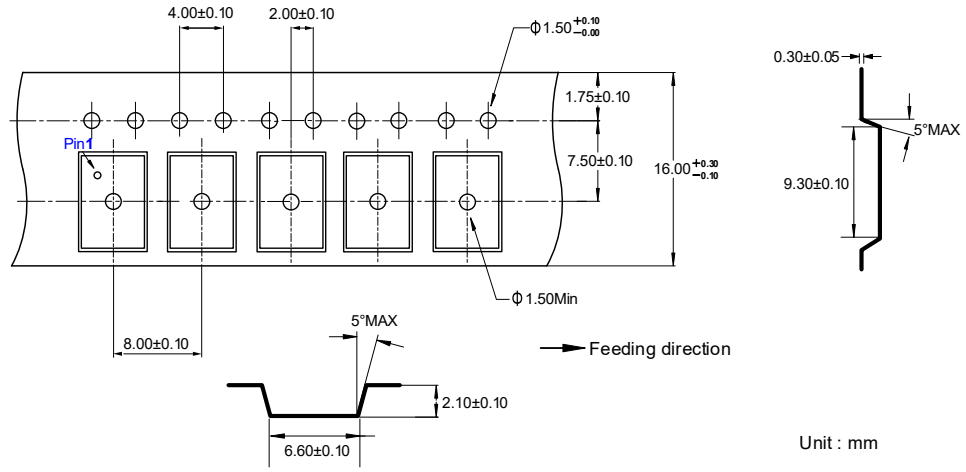
COMMON DIMENSIONS

(Unit: mm)

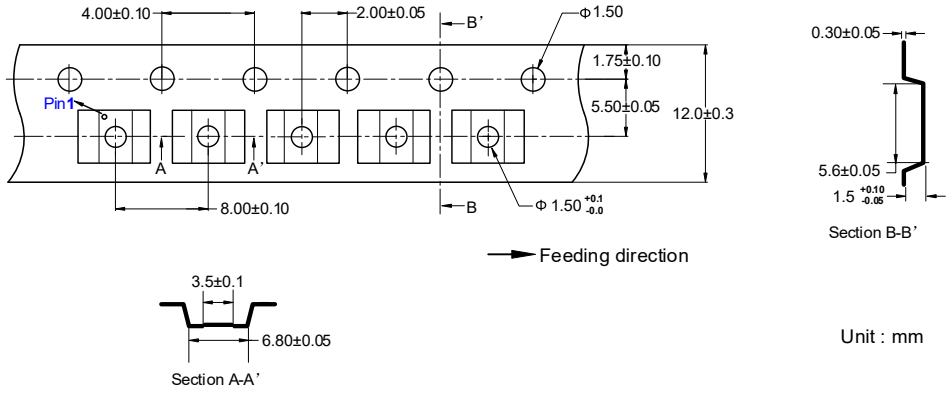
SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.20	0.25	0.30
c		0.20 REF	
D	2.90	3.00	3.10
D2	1.40	1.50	1.60
Ne		2.00 BSC	
e		0.50 BSC	
E	2.40	2.50	2.60
E2	0.90	1.00	1.10
L	0.30	0.40	0.50
K	0.20	-	-
h		0.25 REF	

Tape Information

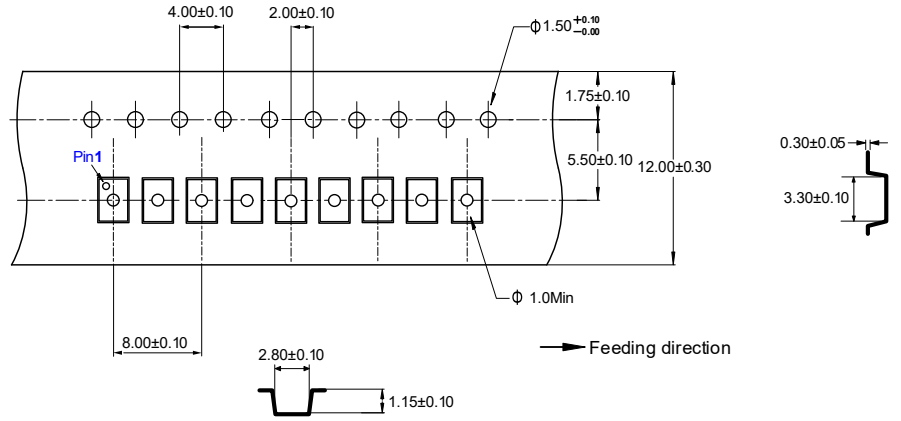
SOP14 (3.9mm × 8.65mm)



TSSOP14 (5.0mm × 4.4mm)



QFN14 (3.0mm × 2.5mm)



Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-11-06	Official Version	Jiang qipeng	Yang xiaoxu	Liu jiaying
1.1	2025-01-05	Update Format, Add Marking	Xu tao	Yang xiaoxu	Liu jiaying