Dual Inverter with Schmitt-Trigger Inputs

General Description

The ET74LVC2G14 is a high-performance dual inverter with schmitt-trigger inputs operating from a 1.65V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

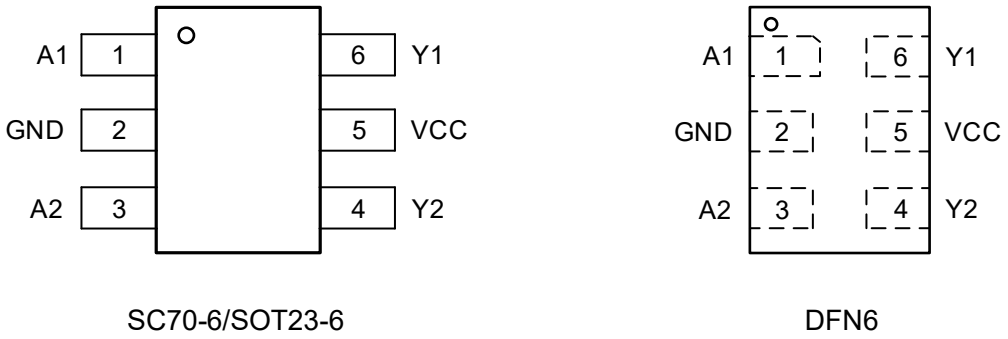
The ET74LVC2G14 is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, it has a greater noise margin than conventional inverters. The ET74LVC2G14 has hysteresis between positive-going and negative-going input thresholds (typically 1V) which is determined internally by transistor radios and is essentially insensitive to temperature and supply voltage variations.

Features

- Designed for 1.65V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- ±32mA Balanced Output Sink and Source Capability
- Near-zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JESD22 Standard
  -- HBM: ±2000V Pass (JEDEC JS-001)
  -- CDM: ±1000V Pass (JEDEC JS-002)
- Latch-up Performance Exceeds ±100mA per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74LVC2G14	SC70-6 (1.3mm×2.1mm)	Tape and Reel, 3K/Reel	1
ET74LVC2G14T	SOT23-6 (1.6mm×2.9mm)	Tape and Reel, 3K/Reel	3
ET74LVC2G14Y	DFN6 (1.0mm×1.5mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



SC70-6/SOT23-6 DFN6

Figure1. Pin Configuration

Pin Function

SC70-6/ SOT23-6/DFN6

Pin No.	Pin Name	Function
1	A1	Input CH1
2	GND	Ground
3	A2	Input CH2
4	Y2	Output CH2
5	VCC	Supply Voltage
6	Y1	Output CH1

Block Diagram

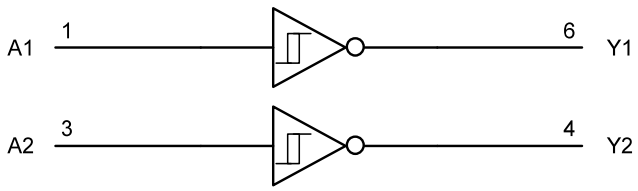


Figure2. Logic Symbol

Function Table

Input A	Output Y
L	H
H	L

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to 6.5	V
V_I	DC Input Voltage[1]		$-0.5 \le V_I \le 6.5$	V
V_O	DC Output Voltage Output in Higher or Low State		-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current, V_I < GND		-50	mA
I_{OK}	DC Output Diode Current, V_O < GND, V_O > V_{CC}		±50	mA
I_O	DC Output Sink Current		±50	mA
I_{CC}	DC Supply Current per Supply Pin		±100	mA
I_{GND}	DC Ground Current per Supply Pin		±100	mA
T_{STG}	Storage Temperature Range		-65 to 150	°C
T_L	Lead Temperature, Soldering 10 Seconds		260	°C
T_J	Max Junction Temperature		150	°C
V_{ESD}	ESD Classification	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]		±100	mA

Stresses exceeding those listed in this table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1: I_O 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.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SC70-6	Thermal Characteristics, Thermal Resistance, Junction-to-Air	280	°C/W
	SOT23-6		180	
	DFN6		440	
P_D	SC70-6	Power Dissipation in Still Air at 85°C	230	mW
	SOT23-6		360	
	DFN6		150	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		1.65	5.5	V
V_I	DC Input Voltage		0	V_{CC}	V
V_O	DC Output Voltage (High or Low State)		0	V_{CC}	V
T_A	Operating Temperature Range		-40	125	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2.5V ± 0.2V	0	20	ns/V
		V_{CC} = 3.0V ± 0.3V	0	10	
		V_{CC} = 5.0V ± 0.5V	0	5	

Electrical Characteristics

DC Electrical Characteristics

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25°C			-40°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High-Level Input Voltage		1.65~1.95 2.3~5.5	0.75V_{CC} 0.7V_{CC}			0.75V_{CC} 0.7V_{CC}		V
V_{IL}	Low-Level Input Voltage		1.65~1.95 2.3~5.5			0.25V_{CC} 0.3V_{CC}		0.25V_{CC} 0.3V_{CC}	V
V_{OH}	High-Level Output Voltage V_{IN} = V_{IL}	I_{OH} = -100uA	1.65~5.5	V_{CC} - 0.1	V_{CC}		V_{CC} - 0.1		V
		I_{OH} = -3mA	1.65	1.29	1.52		1.29		
		I_{OH} = -8mA	2.3	1.9	2.1		1.9		
		I_{OH} = -12mA	2.7	2.2	2.4		2.2		
		I_{OH} = -16mA	3.0	2.4	2.7		2.4		
		I_{OH} = -24mA	3.0	2.3	2.5		2.3		
		I_{OH} = -32mA	4.5	3.8	4.0		3.8		
V_{OL}	Low-Level Output Voltage V_{IN} = V_{IH}	I_{OH} = 100uA	1.65~5.5		0.0	0.1		0.1	V
		I_{OL} = 3mA	1.65		0.08	0.24		0.24	
		I_{OL} = 8mA	2.3		0.20	0.3		0.3	
		I_{OL} = 12mA	2.7		0.22	0.4		0.4	
		I_{OL} = 16mA	3.0		0.28	0.4		0.4	
		I_{OL} = 24mA	3.0		0.38	0.55		0.55	
		I_{OL} = 32mA	4.5		0.42	0.55		0.55	
I_{IN}	Input Leakage Current	V_I = 5.5V or GND	0~5.5		±0.1			±1.0	μA
I_{OFF}	Power Off Leakage Current	V_I = 5.5V or V_O = 5.5V	0			1		10	μA
I_{CC}	Quiescent Supply Current	V_I = 5.5V or GND	5.5					10	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC Electrical Characteristics

$t_r = t_f$ = 3ns; C_L = 50pF; R_L = 500Ω

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25°C			-40°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure 3 and 4)	R_L = 1MΩ, C_L = 15pF	1.65	2.0	10.1	12.9	2.0	13.9	ns
			1.8	2.0	9.1	11.6	2.0	12.4	
		R_L = 1MΩ, C_L = 15pF	2.5	0.2	6.0	7.7	0.8	8.2	
		R_L = 1MΩ, C_L = 15pF	3.3	0.8	5.0	6.5	0.5	7.0	
		R_L = 500Ω, C_L = 50pF		1.2	5.6	7.1	1.5	7.6	
		R_L = 1MΩ, C_L = 15pF	5.0	0.5	4.4	5.6	0.5	6.1	
		R_L = 500Ω, C_L = 50pF		0.8	4.8	6.1	0.8	6.6	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5V, V_I = 0V or V_{CC}	3	pF
C_{PD}	Power Dissipation Capacitance (5)	10MHz, V_{CC} = 3.3V, V_I = 0V or V_{CC}	26	pF
		10MHz, V_{CC} = 5.5V, V_I = 0V or V_{CC}	30	

Note5: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

AC Test Circuit

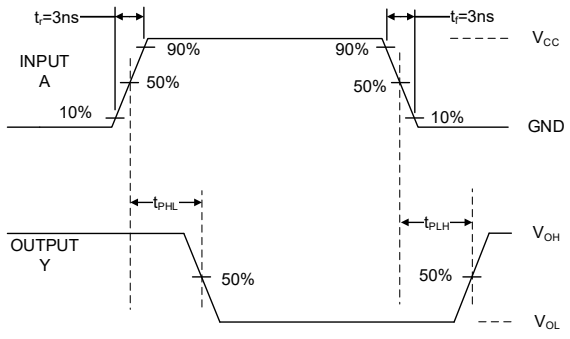


Figure3. Switching Waveform

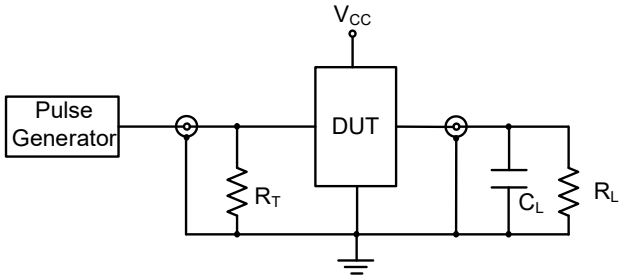
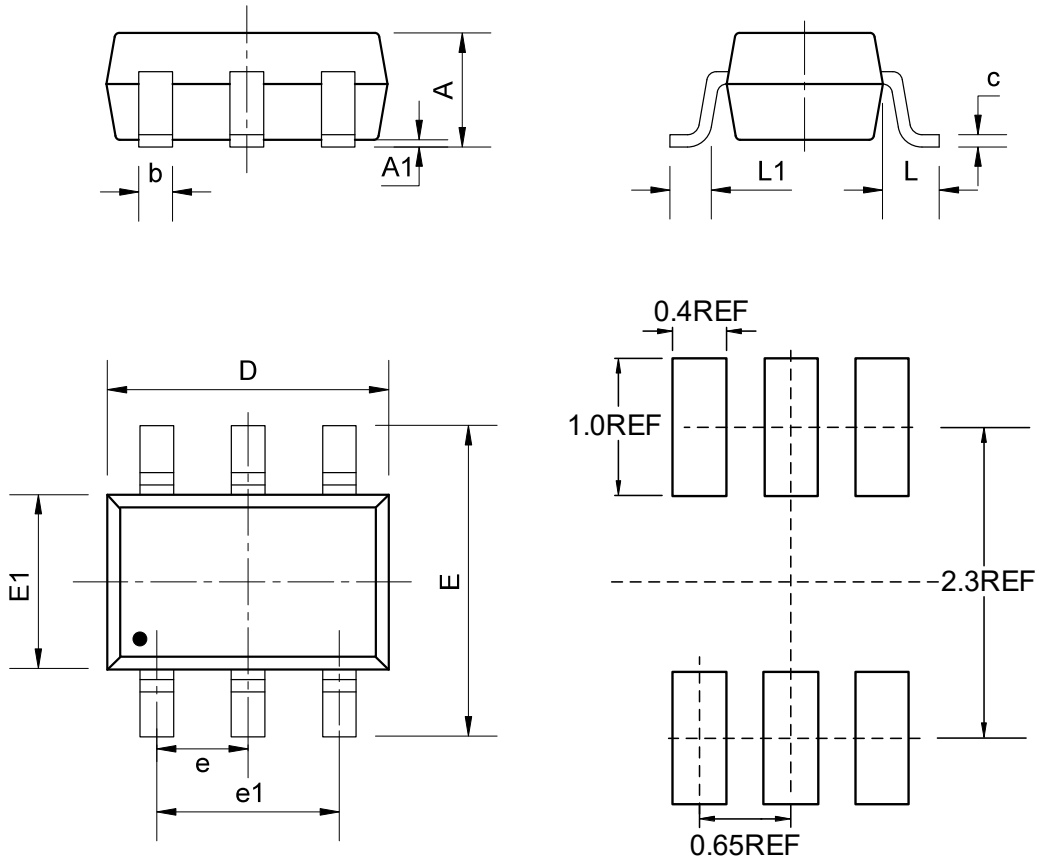


Figure4. Test Circuit

Package Dimension

SC70-6 (1.3mm × 2.1mm)

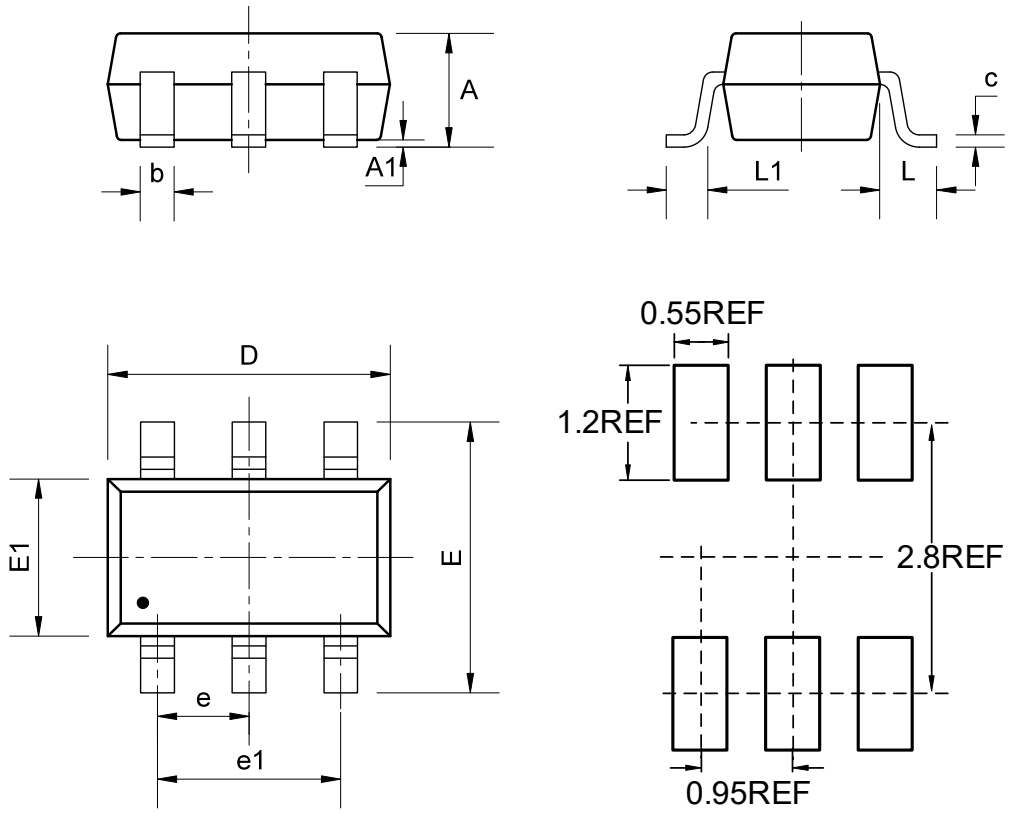


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.10
A1	0.00	-	0.15
b	0.15	-	0.35
c	0.08	-	0.20
D	2.00	2.10	2.30
e	0.65BSC		
e1	1.30BSC		
E	2.15	2.30	2.50
E1	1.15	1.30	1.45
L	0.50REF		
L1	0.33REF		

SOT23-6 (1.6mm × 2.9mm)

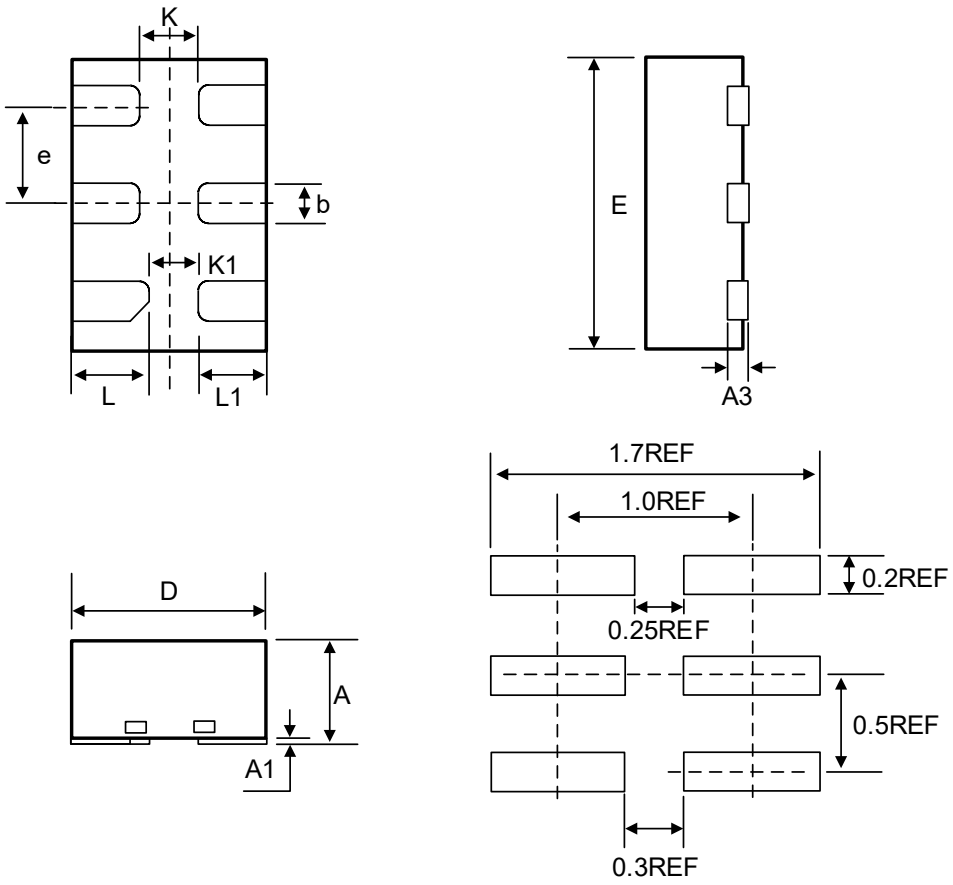


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

DFN6 (1.0mm × 1.5mm)



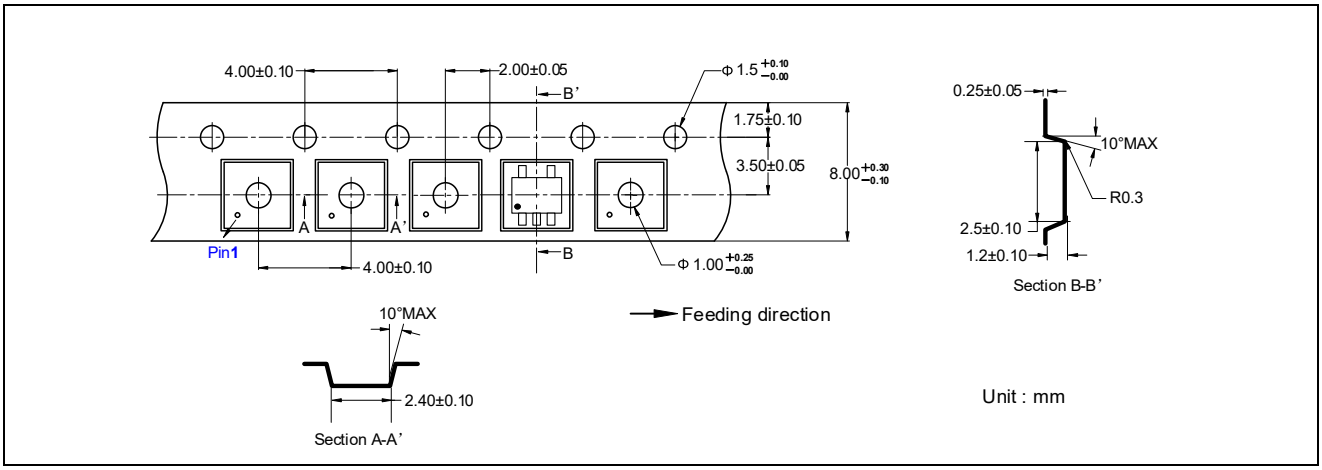
COMMON DIMENSIONS

(Unit: mm)

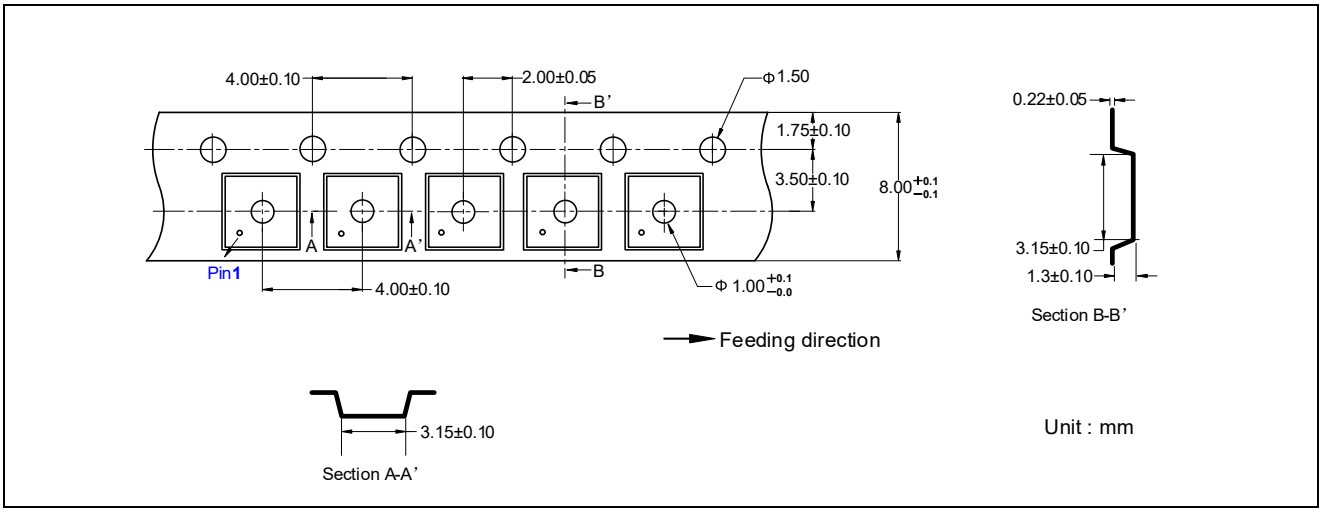
SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0.00	0.02	0.05
A3		0.10REF	
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e		0.50BSC	
K		0.30REF	
K1		0.25REF	
L	0.35	0.40	0.45
L1	0.30	0.35	0.40

Tape Information

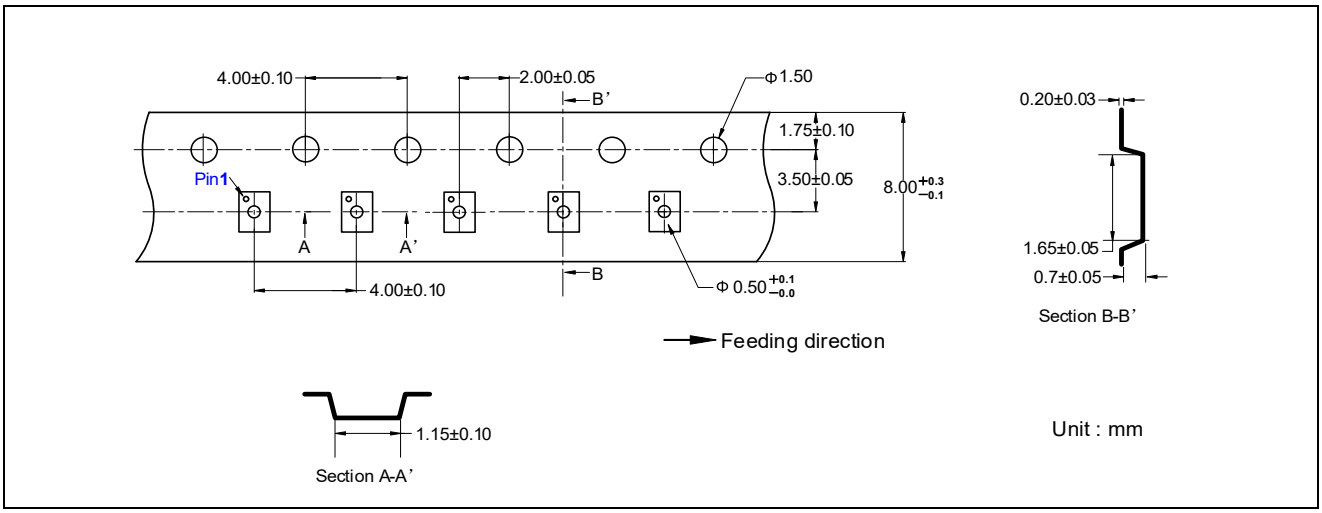
SC70-6 (1.3mm × 2.1mm)



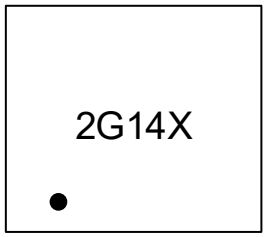
SOT23-6 (1.6mm × 2.9mm)



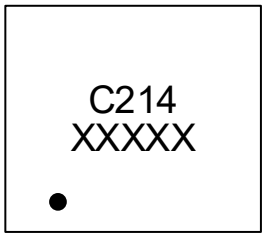
DFN6 (1.0mm × 1.5mm)



Marking Information



ET74LVC2G14
2G14 = Part Number
X = Tracking Number



ET74LVC2G14T
C214 = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-10-23	Original Version	Ma yongjian	Ma yongjian	Liu jiaying
1.1	2022-11-24	Update format and Thermal Characteristics	Shi bo	Shi bo	Shi bo
1.2	2023-11-29	Update Typeset /ESD	Shi bo	Shi bo	Shi bo
1.3	2025-06-04	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.3.a	2026-04-17	Update Format, Add Tape and Marking	Xu tao	Yang xiaoxu	Liu jiaying