

Single 2-Input NAND Gate With Schmitt-Trigger Input

General Description

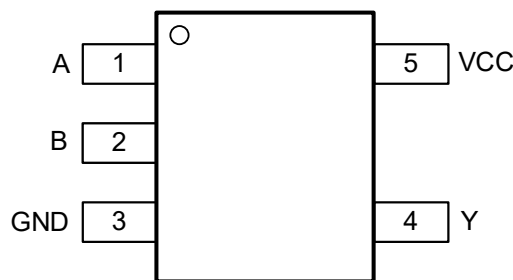
The ET74AHC1G132 is a single 2-input NAND Gate with schmitt-trigger input operating from a 2V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 2V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- $\pm 8\text{mA}$ 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: $\pm 2000\text{V}$ Pass (JEDEC JS-001)
 - CDM: $\pm 1500\text{V}$ Pass (JEDEC JS-002)
- Latch-up Performance Exceeds $\pm 100\text{mA}$ per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74AHC1G132	SC70-5 (1.3mm×2.1mm)	Tape and Reel, 3K/Reel	1
ET74AHC1G132T	SOT23-5 (1.6mm×2.9mm)	Tape and Reel, 3K/Reel	3

Pin Configuration



SC70-5/SOT23-5

Figure1. Pin Configuration

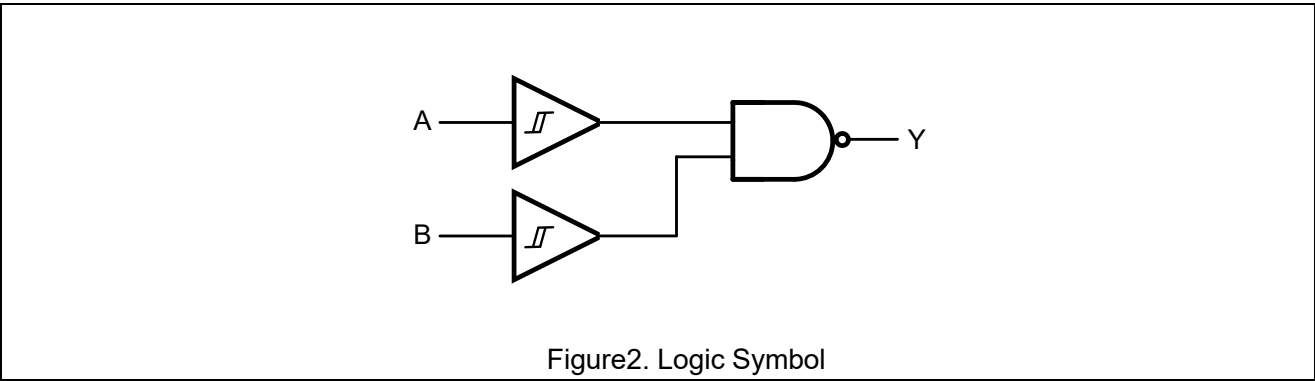
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Pin Function

SC70-5/SOT23-5

Pin No.	Pin Name	Function
1	A	Data Input
2	B	Data Input
3	GND	Ground (0V)
4	Y	Data Output
5	VCC	Supply Voltage

Block Diagram



Functional Description

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

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Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage (VCC Pin)		-0.5 to 7.0	V
I _{IK}	DC Input Diode Current, V _I < GND		-50	mA
V _I	DC Input Voltage ⁽¹⁾		-0.5 ≤ V _I ≤ 7.0	V
I _{OK}	DC Output Diode Current, V _O < GND		-50	mA
V _O	DC Output Voltage Output in Higher or Low State		-0.5 to V _{CC} + 0.5	V
I _O	DC Output Sink Current, V _O = 0V to V _{CC}		±50	mA
I _{CC}	DC Supply Current per Supply Pin		100	mA
I _{GND}	DC Ground Current per Supply Pin		-100	mA
T _J	Max Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-65 to 150	°C
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±2000	V
		Charged Device Model ⁽³⁾	±1500	
I _{LU}	Max Latch Up Current Above V _{CC} and GND at 125°C ⁽⁴⁾		±100	mA

Stresses exceeding those listed in the Maximum Ratings 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.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage Operating	2	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

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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 _{OH}	High-Level Output Voltage	V _I = V _{T+} or V _{T-}							V
		I _{OH} = -100μA	2	V _{CC} - 0.1	V _{CC}		V _{CC} - 0.1		
		I _{OH} = -4mA	3	2.58			2.4		
		I _{OH} = -8mA	5.5	3.54			3.7		
V _{OL}	Low-Level Output Voltage	V _I = V _{T+} or V _{T-}							V
		I _{OL} = 100μA	2			0.1		0.1	
		I _{OL} = 4mA	3			0.36		0.55	
		I _{OL} = 8mA	5.5			0.36		0.55	
I _I	Input Leakage Current	V _I = 5.5V or GND	0~5.5		±0.1	±1.0		±1.0	uA
I _{OFF}	Power Off Leakage Current	V _I = 5.5V or V _O = 5.5V	0		±0.1	±2.0		±2.0	uA
I _{CC}	Quiescent Supply Current	V _I = 5.5V or GND	5.5		0.1	4		4	uA

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AC Electrical Characteristics

$t_r = t_f = 3\text{ns}$, $R_L = 1\text{k}\Omega$

Symbol	Parameter	Condition	$V_{CC}(\text{V})$	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 and 4)	$C_L = 15\text{pF}$	3~3.6		3.8	7.1	1.0	8.0	ns
		$C_L = 50\text{pF}$	3~3.6		4.4	8.6	1.0	9.5	
		$C_L = 15\text{pF}$	4.5~5.5		2.9	5.6	1.0	6.6	
		$C_L = 50\text{pF}$	4.5~5.5		3.4	6.6	1.0	7.6	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 3.3\text{V}$, $V_I = 0\text{V}$ or V_{CC}	3.5	pF
C_{PD}	Power Dissipation Capacitance ⁽⁵⁾	10MHz, $V_{CC} = 3.3\text{V}$, $V_I = 0\text{V}$ or V_{CC}	15	pF

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

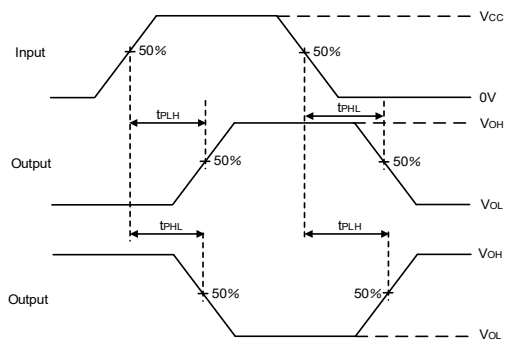


Figure3. Switching Waveform

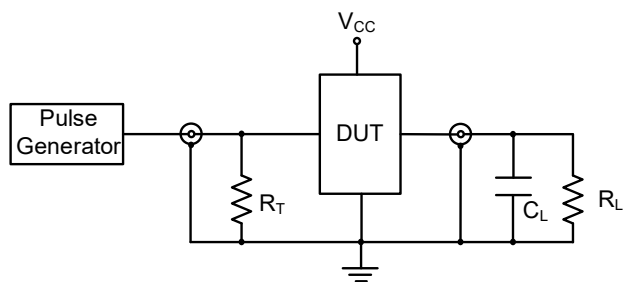


Figure4. Test Circuit

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Electrical Characteristics (Continued)

Transfer Characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0V).

Symbol	Parameters	Conditions	-40°C ≤ T _A ≤ 85°C			-40°C ≤ T _A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	
V _{T+}	Positive-going Threshold Voltage	See Figure 5, 6, 7, 8						
		V _{CC} = 2.0V	0.78		1.30	0.74	1.30	V
		V _{CC} = 3.0V	1.50		2.00	1.47	2.00	V
		V _{CC} = 4.5V	2.16		2.74	2.13	2.74	V
		V _{CC} = 5.5V	2.61		3.33	2.58	3.33	V
V _{T-}	Negative-going Threshold Voltage	See Figure 5, 6, 7, 8						
		V _{CC} = 2.0V	0.35		0.80	0.35	0.83	V
		V _{CC} = 3.0V	0.80		1.30	0.80	1.33	V
		V _{CC} = 4.5V	1.21		1.90	1.21	1.93	V
		V _{CC} = 5.5V	1.45		2.29	1.45	2.32	V
V _H	Hysteresis Voltage	(V _H = V _{T+} - V _{T-}) See Figure 5, 6, 7, 8						
		V _{CC} = 2.0V	0.35		0.68	0.28	0.68	V
		V _{CC} = 3.0V	0.50		1.00	0.44	1.00	V
		V _{CC} = 4.5V	0.71		1.2	0.65	1.2	V
		V _{CC} = 5.5V	0.71		1.4	0.65	1.4	V

Wave-forms Transfer Characteristics

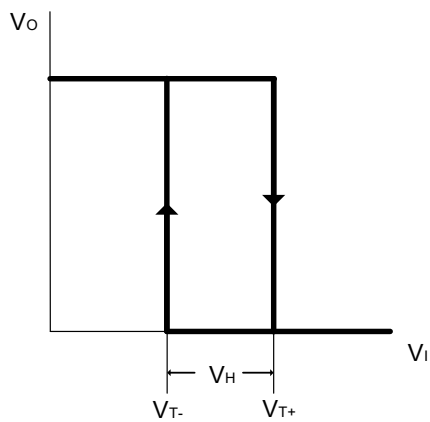
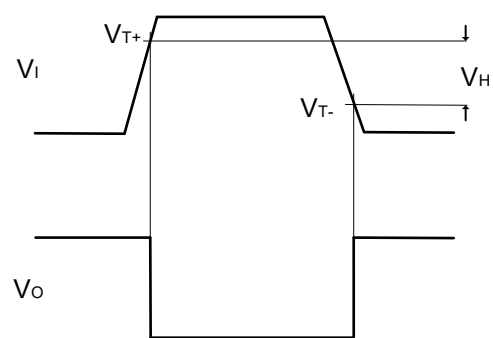


Figure5. Transfer characteristic



V_{T+} and V_{T-} limits are at 70 % and 20 %
Figure6. Definition of V_{T+} , V_{T-} and V_H

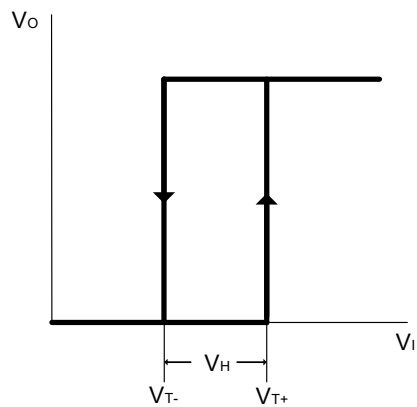
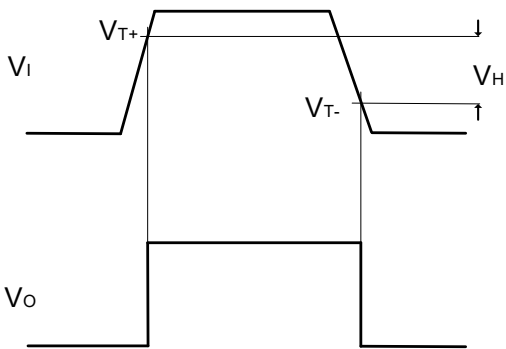


Figure7. Transfer characteristic

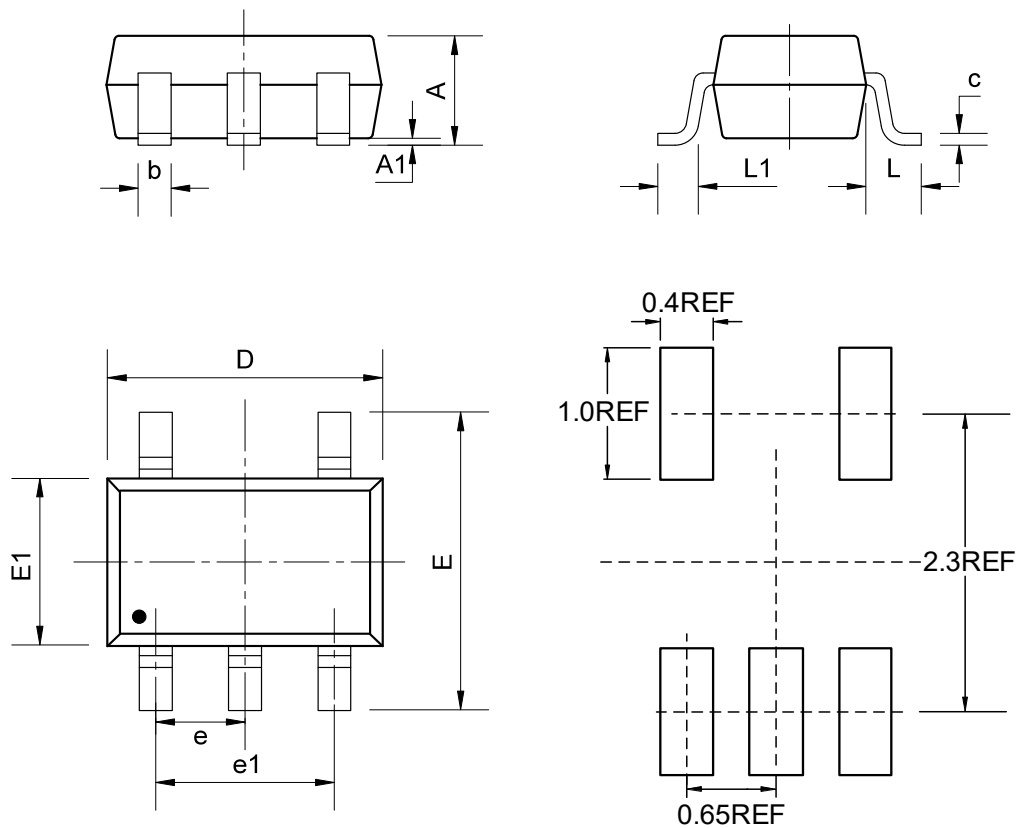


V_{T+} and V_{T-} limits are at 70 % and 20 %
Figure8. Definition of V_{T+} , V_{T-} and V_H

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Package Dimension

SC70-5 (1.3mm × 2.1mm)



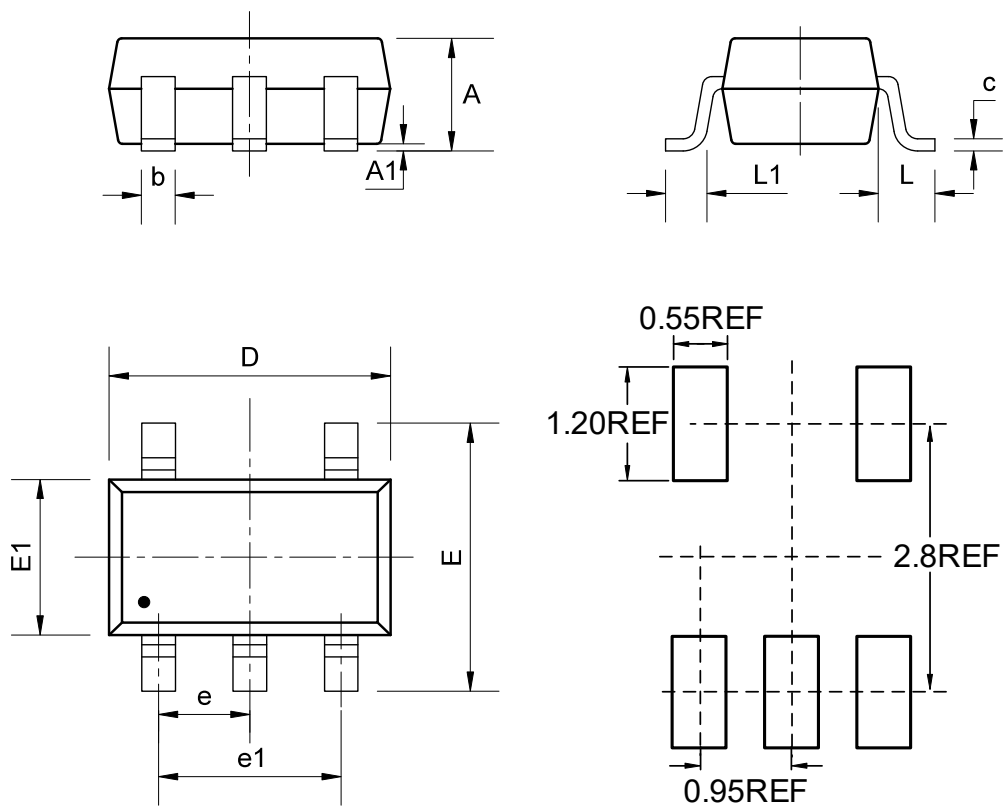
COMMON DIMENSIONS

(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		

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SOT23-5 (1.6mm × 2.9mm)



COMMON DIMENSIONS

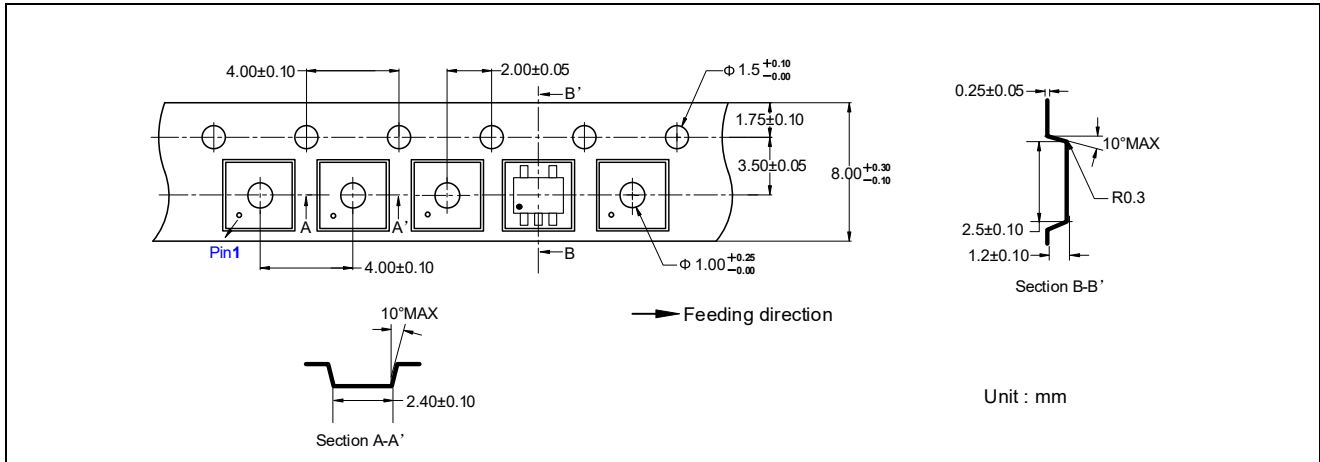
(Unit: mm)

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

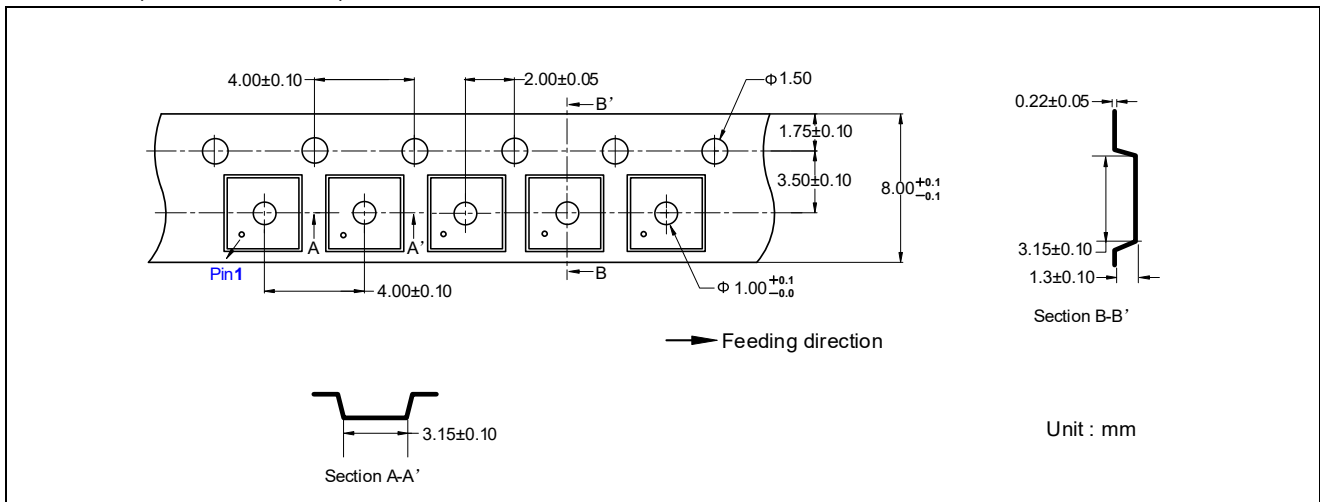
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Tape Information

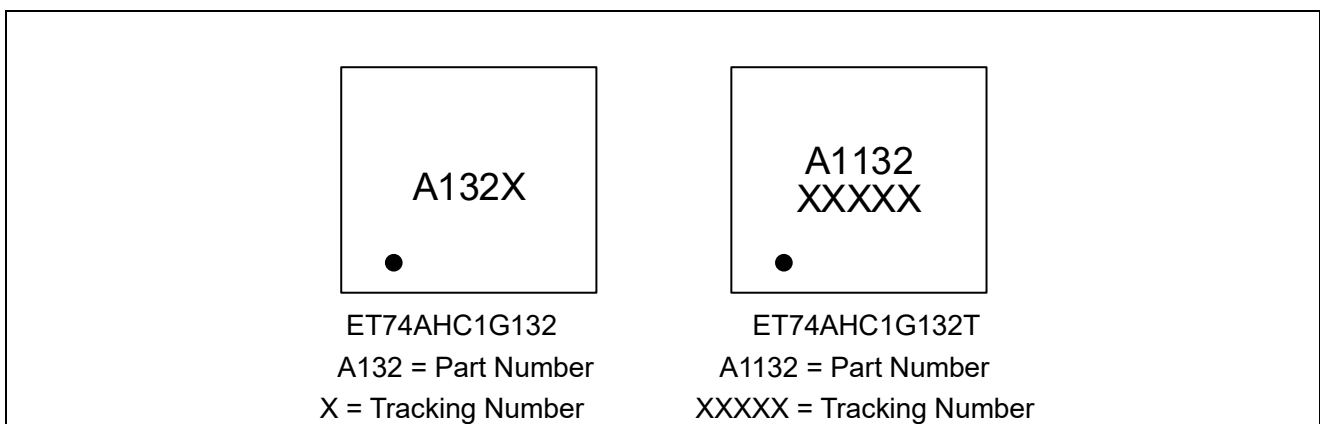
SC70-5 (1.3mm × 2.1mm)



SOT23-5 (1.6mm × 2.9mm)



Marking Information



ET74AHC1G132

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-11-21	Official Version	Xu tao	Yang xiaoxu	Liu jiaying