

Single 2-Input NAND Gate with Open Drain Output

General Description

The ET74AHCT1G38 is a high performance single 2-input NAND gate with open drain output operating from a 4.5V to 5.5V supply. The Output stage is open drain with Over Voltage Tolerance. This allows the ET74AHCT1G38 to be used to interface 5.0V circuits to circuits of any voltage between 0V and 6.5V.

Features

- Designed for 4.5V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- 8mA Output Sink 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: $\pm 4000V$ Pass (JEDEC JS-001)
 - CDM: $\pm 1000V$ Pass (JEDEC JS-002)
- Latch-up Performance Exceeds $\pm 100mA$ per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74AHCT1G38	SC70-5 (1.3mm $\times$ 2.1mm)	Tape and Reel, 3K/Reel	1
ET74AHCT1G38T	SOT23-5 (1.6mm $\times$ 2.9mm)	Tape and Reel, 3K/Reel	3
ET74AHCT1G38Y	DFN6 (1.0mm $\times$ 1.5mm)	Tape and Reel, 3K/Reel	1

Pin Configuration

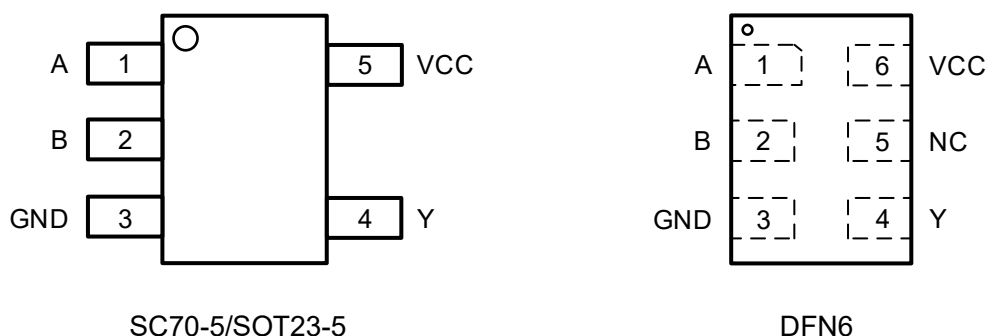


Figure1. Pin Configuration

ET74AHCT1G38

Pin Function

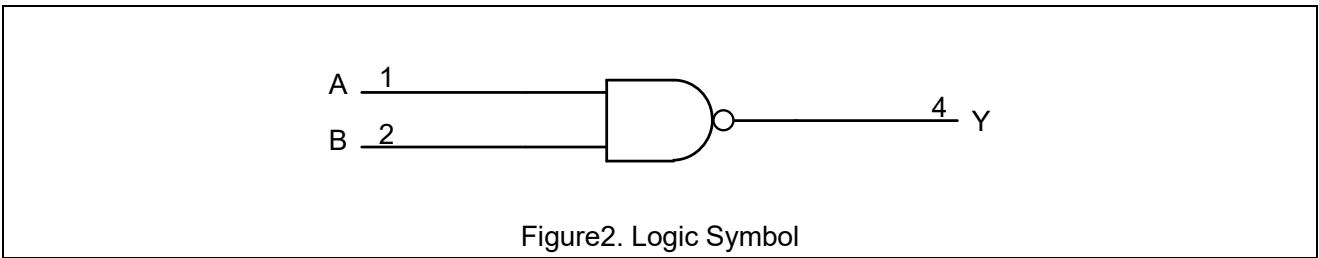
SC70-5/SOT23-5

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

DFN6

Pin No.	Pin Name	Function
1	A	Input A
2	B	Input B
3	GND	Ground
4	Y	Output
5	NC	No Connect
6	VCC	Supply Voltage

Block Diagram



Functional Table

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

ET74AHCT1G38

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage (VCC Pin)		-0.5 to 7.0	V
V _I	DC Input Voltage ⁽¹⁾		-0.5 ≤ V _I ≤ 7.0	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 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.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
R _{θJA}	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6		440	
P _D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6		150	

ET74AHCT1G38

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage	4.5	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

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

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		4.5	2			2		V
			5.5	2			2		
V _{IL}	Low-Level Input Voltage		4.5			0.8		0.8	V
			5.5			0.8		0.8	
V _{OL}	Low-Level Output Voltage	I _{OL} = 50uA	4.5			0.1		0.1	V
		I _{OL} = 8mA				0.36		0.44	
I _I	Input Leakage Current	V _I = 5.5V or GND	0~5.5			±0.1		±1.0	uA
I _{OFF}	Power Off Leakage Current	V _I = 5.5V or V _O = 5.5V	0			1		10	uA
I _{CC}	Quiescent Supply Current	V _I = 5.5V or GND	5.5			1		10	uA

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.

ET74AHCT1G38

AC Electrical Characteristics

$t_r = t_f = 3\text{ns}$, $R_1 = R_L = 1\text{k}\Omega$; Over recommended operating free-air temperature range, $V_{CC} = 5\text{V} \pm 0.5\text{V}$ (unless otherwise noted)

Symbol	Parameter	Condition	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
			Min	Typ	Max	Min	Max	
t_{PLZ}	Propagation Delay	$C_L = 15\text{pF}$		5	8	1.0	10	ns
t_{PZL}		$C_L = 50\text{pF}$		6.5	10	1.0	12	ns

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5\text{V}$, $V_I = 0\text{V}$ or V_{CC}	5	pF
C_{PD}	Power Dissipation Capacitance ⁽⁵⁾	10MHz, $V_{CC} = 5\text{V}$, $V_I = 0\text{V}$ or V_{CC}	28	pF

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

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

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

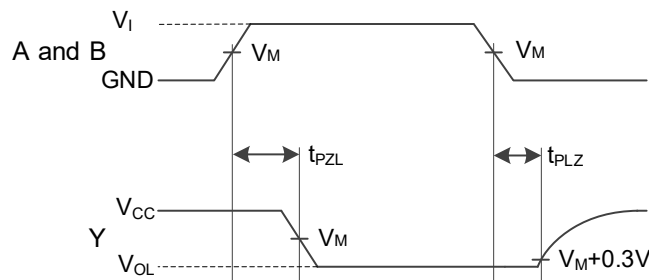


Figure3. Switching Waveform

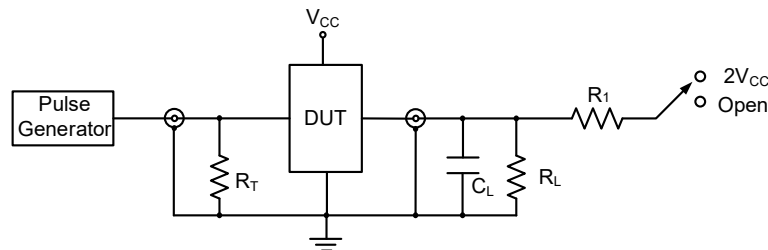
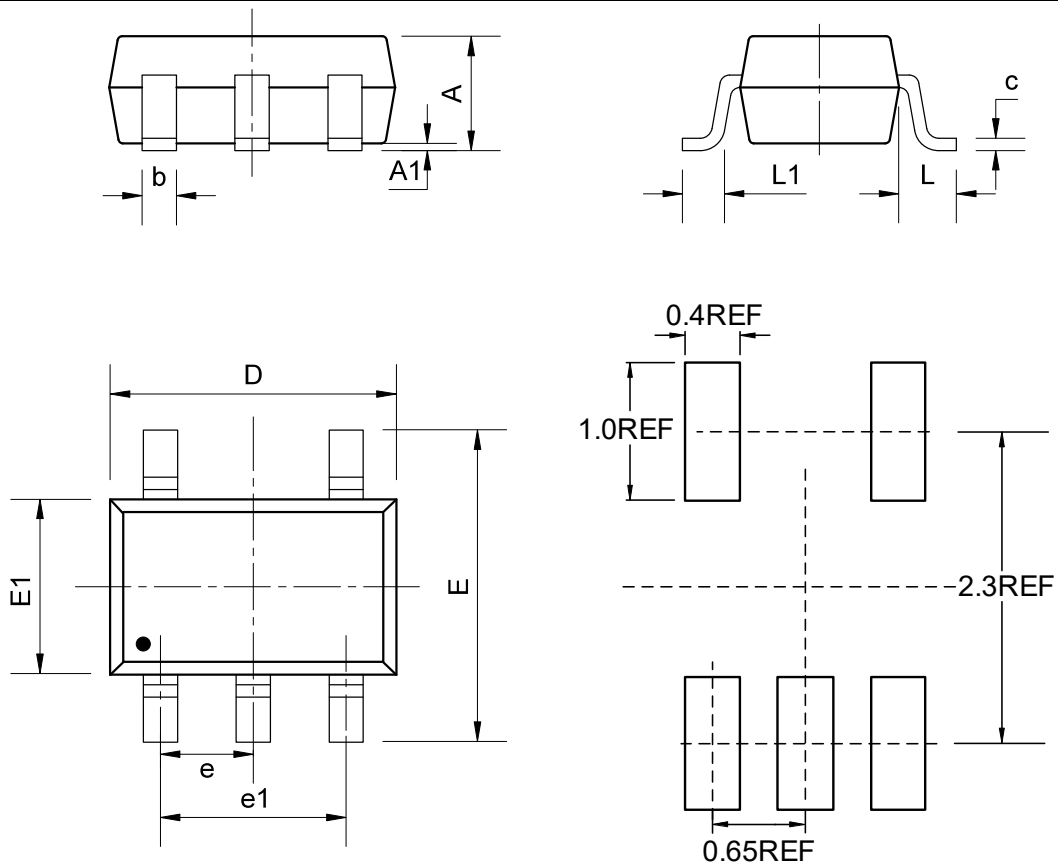


Figure4. Test Circuit $R_T = 50\Omega$ (Typ)

ET74AHCT1G38

Package Dimension

SC70-5 (1.3mm × 2.1mm)



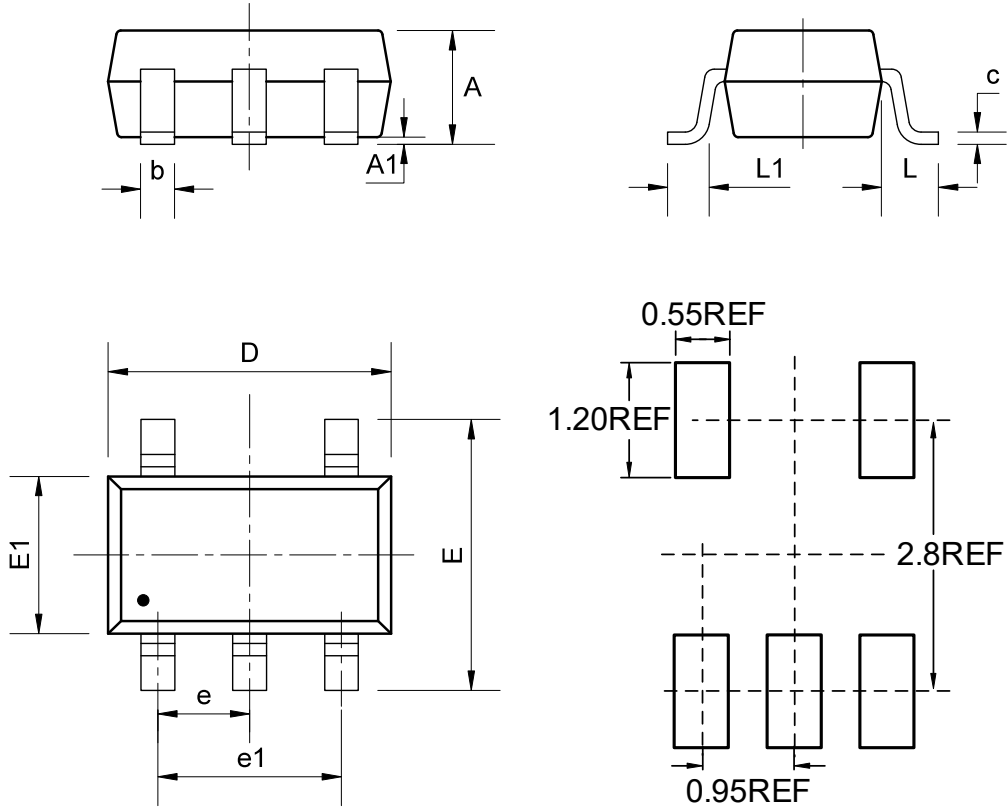
COMMON DIMENSIONS

(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		

ET74AHCT1G38

SOT23-5 (1.6mm × 2.9mm)



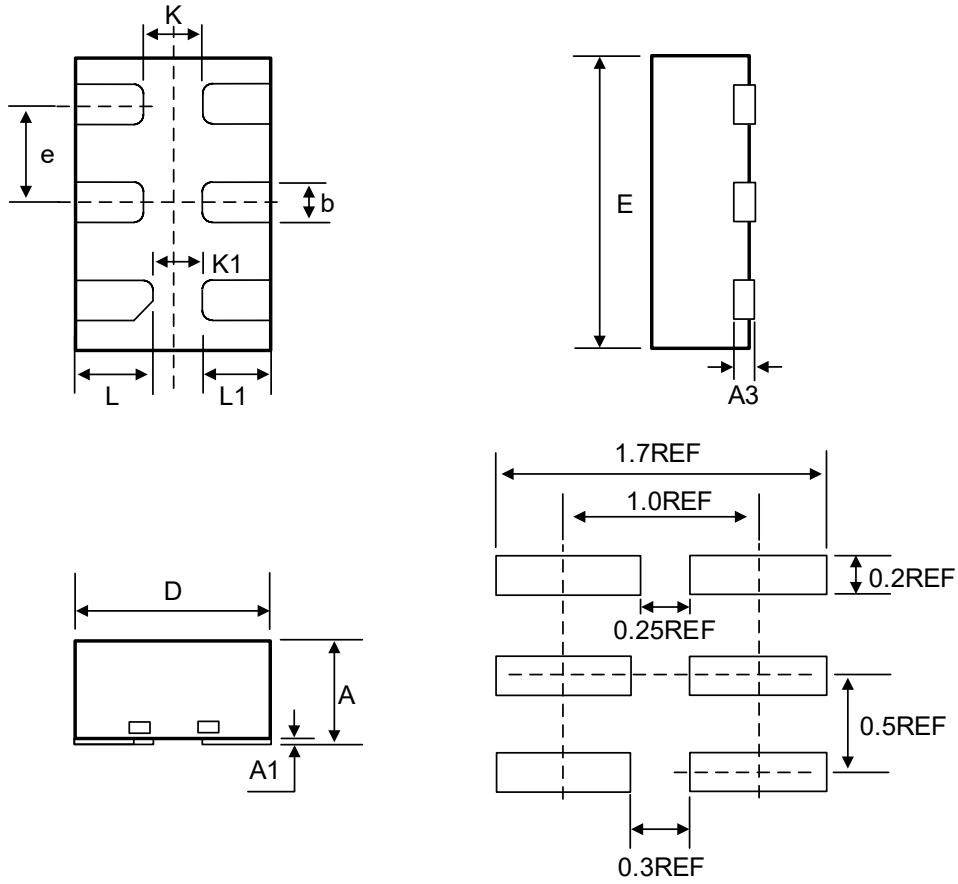
COMMON DIMENSIONS

(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

ET74AHCT1G38

DFN6 (1.0mm × 1.5mm)



COMMON DIMENSIONS

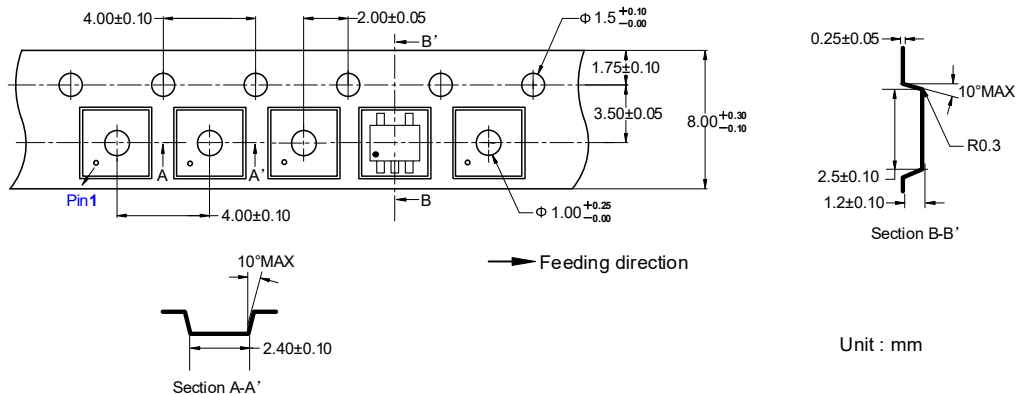
(Unit: mm)

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

ET74AHCT1G38

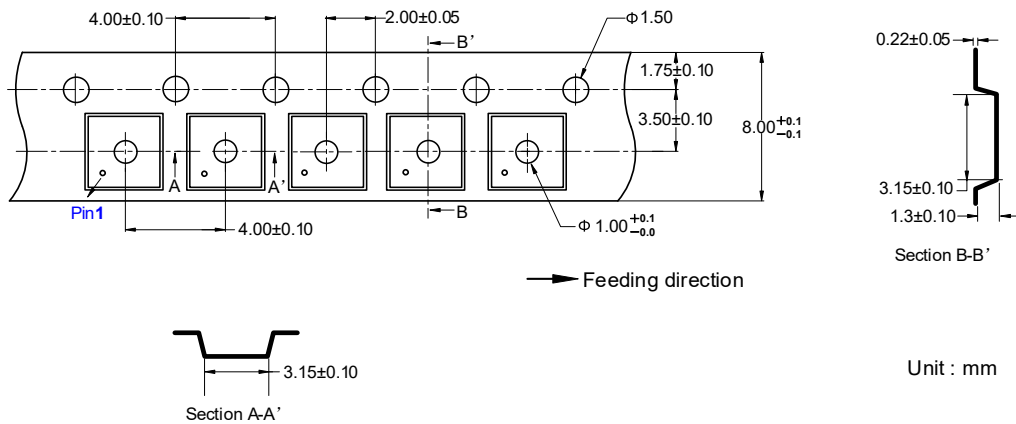
Tape Information

SC70-5 (1.3mm × 2.1mm)



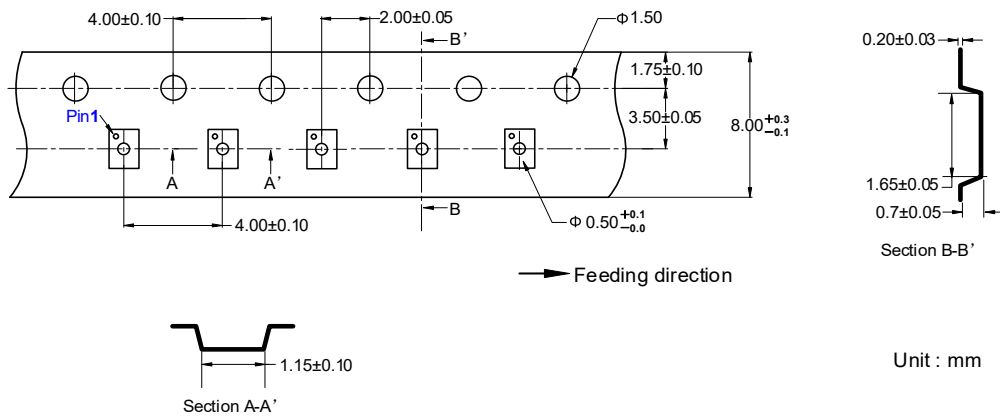
Unit : mm

SOT23-5 (1.6mm × 2.9mm)



Unit : mm

DFN6 (1.0mm × 1.5mm)



Unit : mm

ET74AHCT1G38

Marking Information

T138X ET74AHCT1G38 T138 = Part Number X = Tracking Number	T138 XXXXX ET74AHCT1G38T T138 = Part Number XXXXX = Tracking Number
---	---

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2026-04-07	Official Version	Xu tao	Yang xiaoxu	Liu jiaying