ET74LVC2G08 - Dual 2-Input NAND Gate

With Open-Drain Outputs

General Description

The ET74LVC2G08 is designed for 1.65V to 5.5V V_{CC} operation.

This device is a dual two-input NAND buffer gate with open-drain outputs. It performs the Boolean function $Y= A \times B$ or $Y= \overline{A}+\overline{B}$ in positive logic.

This device is fully specified for partial-power-down applications using I_{OFF}. The I_{OFF} circuitry disables the outputs, preventing damaging current back-flow through the device when it is powered down.

Features

- Supports 5V V_{CC} Operation
- Inputs Accept Voltages to 5.5V
- Max t_{pd} of 4.7ns at 3.3V
- Low Power Consumption, 10μA Max I_{CC}
- ±24mA Output Drive at 3.3V
- Typical V_{OLP} (Output Ground Bounce) < 0.8V at V_{CC} = 3.3V, T_A = 25°C
- Typical V_{OHV} (Output V_{OH} Undershoot) > 2V at V_{CC} = 3.3V, T_A = 25°C
- I_{OFF} Supports Live Insertion, Partial-power-down Mode Operation and Back Drive Protection
- Can be Used as a Down Translator to Translate Inputs From a Maxium of 5.5V Down to the V_{CC} Level
- Latch-up Performance Exceeds 100mA Per JESD78, Class II
- ESD Protection Exceeds JESD22
  - 2000V Human-Body Model (A114-A)
  - 1000V Charged-Device Model (C101)

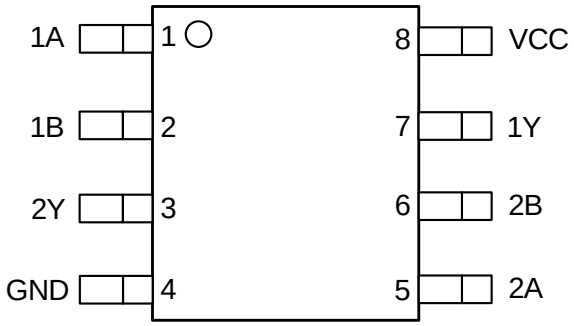
Applications

- IP Phones: Wired and Wireless
- Optical Networking: EPON and Video Over Fiber
- Point-to-point Microwave Backhaul
- Power: Telecom DC/DC Module: Analog
- Power: Telecom DC/DC Module: Digital
- Private Branch Exchange (PBX)
- Telecom Shelter: Power Distribution Unit (PDU)
- Vector Signal Analyzers and Generators
- Wireless Communications Testers
- Wireless Repeaters
- xDSL Modem/DSLAM

Device Information

Part No.	Package	Size
ET74LVC2G08U	VSSOP8	2.30mm * 2.00mm
ET74LVC2G08M	SSOP8	2.95mm * 2.80mm

Pin Configuration



ET74LVC2G08U (VSSOP8)
ET74LVC2G08M (SSOP8)
Figure1. Top View

Pin Function

Pin		I/O	Description
Name	No.		
1A	1	Input	Channel 1, Input A
1B	2	Input	Channel 1, Input B
2Y	3	Output	Channel 2, Output Y
GND	4	—	Ground
2A	5	Input	Channel 2, Input A
2B	6	Input	Channel 2, Input B
1Y	7	Output	Channel 1, Output Y
V_{CC}	8	—	Positive Supply

Block Diagram

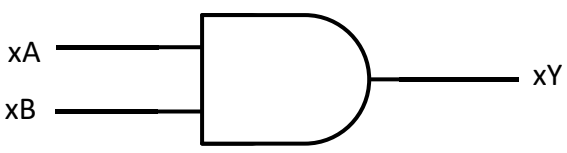


Figure2. Logic Symbol

Functional Description

Function Table

Input		Output
xA	xB	xY
L	L	L
L	H	L
H	L	L
H	H	H

Absolute Maximum Ratings

Symbol	Parameter	Conditions	Rating	Unit
V_{CC}	Supply Voltage		-0.5~+6.5	V
I_{IK}	Input Clamping Current	V_I < 0V	-50	mA
V_I	Input Voltage (1)		-0.5~+6.5	V
I_{OK}	Output Clamping Current	V_O < 0V	-50	mA
V_O	Output Voltage	Active Mode (1)	-0.5~V_{CC}+0.5	V
		Power-Down Mode V_{CC}=0V (1)	-0.5~+6.5	V
I_O	Output Current	V_O = 0V to V_{CC}	±50	mA
I_{CC}	Supply Current		+100	mA
I_{GND}	Ground Current		-100	mA
T_J	Operating Junction Range		-40 to +150	°C
T_{STG}	Storage Temperature		-65 to +150	°C
V_{ESD}	Human Body Mode (2)		±2000	V
	Charged Device Mode (3)		±1000	V
I_{LU}	Latch-up Current (4)		±100	mA

Note1: I_O absolute maximum rating must be observed.

Note2: HBM tested per EIA/JESD22-A114−A;

Note3: CDM tested per EIA/JESD22-C101;

Note4: Latch-up Current Maximum Rating tested per EIA/JESD78E;

Recommended Operating Conditions(5)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	Operating	1.65	5.5	V
		Data Retention Only	1.5		V
V_{IH}	High-level Input Voltage	V_{CC} = 1.65V to 1.95V	0.65 × V_{CC}		V
		V_{CC} = 2.3V to 2.7V	1.7		V
		V_{CC} = 3V to 3.6V	2		V
		V_{CC} = 4.5V to 5.5V	0.7 × V_{CC}		V
V_{IL}	Low-level Input Voltage	V_{CC} = 1.65V to 1.95V		0.35 × V_{CC}	V
		V_{CC} = 2.3V to 2.7V		0.7	V
		V_{CC} = 3V to 3.6V		0.8	V
		V_{CC} = 4.5V to 5.5V		0.3 × V_{CC}	V
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-level Output Current	V_{CC} = 1.65V		-4	mA
		V_{CC} = 2.3V		-8	mA
		V_{CC} = 3V		-16	mA
				-24	mA
		V_{CC} = 4.5V		-32	mA
I_{OL}	Low-level Output Current	V_{CC} = 1.65V		4	mA
		V_{CC} = 2.3V		8	mA
		V_{CC} = 3V		16	mA
				24	mA
		V_{CC} = 4.5V		32	mA
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V		20	ns/V
		V_{CC} = 3.3V ± 0.3V		10	
		V_{CC} = 5V ± 0.5V		5	
T_A	Ambient Temperature	Operating in Free Air	-40	125	°C

Note5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Electrical Characteristics

DC Electrical Characteristics

Over recommended operating free-air temperature range; Typical values measured at V_{CC} = 3.3V, T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Conditions	V_{CC}	Operating Free-air Temperature (T_A)			Unit
				-40°C≤T_A≤125°C			
				Min	Typ	Max	
V_{OH}	High−level Output Voltage	I_{OL} = -100μA	1.65V to 5.5V	V_{CC}-0.1			V
		I_{OL} = -4mA	1.65V	1.2			
		I_{OL} = -8mA	2.3V	1.9			
		I_{OL} = -16mA	3V	2.4			
		I_{OL} = -24mA		2.3			
		I_{OL} = -32mA	4.5V	3.8			
V_{OL}	Low−level Output Voltage	I_{OL} = 100μA	1.65V to 5.5V			0.1	V
		I_{OL} = 4mA	1.65V			0.45	
		I_{OL} = 8mA	2.3V			0.3	
		I_{OL} = 16mA	3V			0.4	
		I_{OL} = 24mA				0.55	
		I_{OL} = 32mA	4.5V			0.55	
I_I	Input Leakage Current	V_I = 5.5V or GND	0 to 5.5V			±5	μA
I_{OFF}		V_I or V_O = 5.5V	0			±10	μA
I_{CC}	Supply Current	V_I = V_{CC} or 0V, I_O = 0	1.65V to 5.5V			10	μA
ΔI_{CC}		One Input at V_{CC} - 0.6V, Other Inputs at V_{CC} or GND	3V to 5.5V			500	μA
C_I	Input Capacitance	V_I = V_{CC} or 0V	3.3V		5		pF

Electrical Characteristics(continued)

Switching Characteristics

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

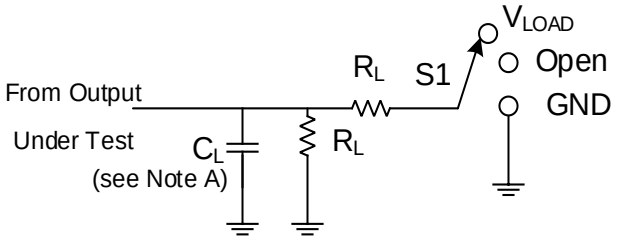
Symbol	Parameter	From	To	V_{CC}	Operating Free-air Temperature (T_A)				Unit
					-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
					Min	Max	Min	Max	
t_{pd}	Propagation Delay	A or B	Y	1.8V ± 0.15V	2.6	9	2.6	9.8	ns
				2.5V ± 0.2V	1	5.1	1	5.8	
				3.3V ± 0.3V	1	4.7	1	5.3	
				5.5V ± 0.5V	1	3.8	1	4.8	

Operating Characteristics

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

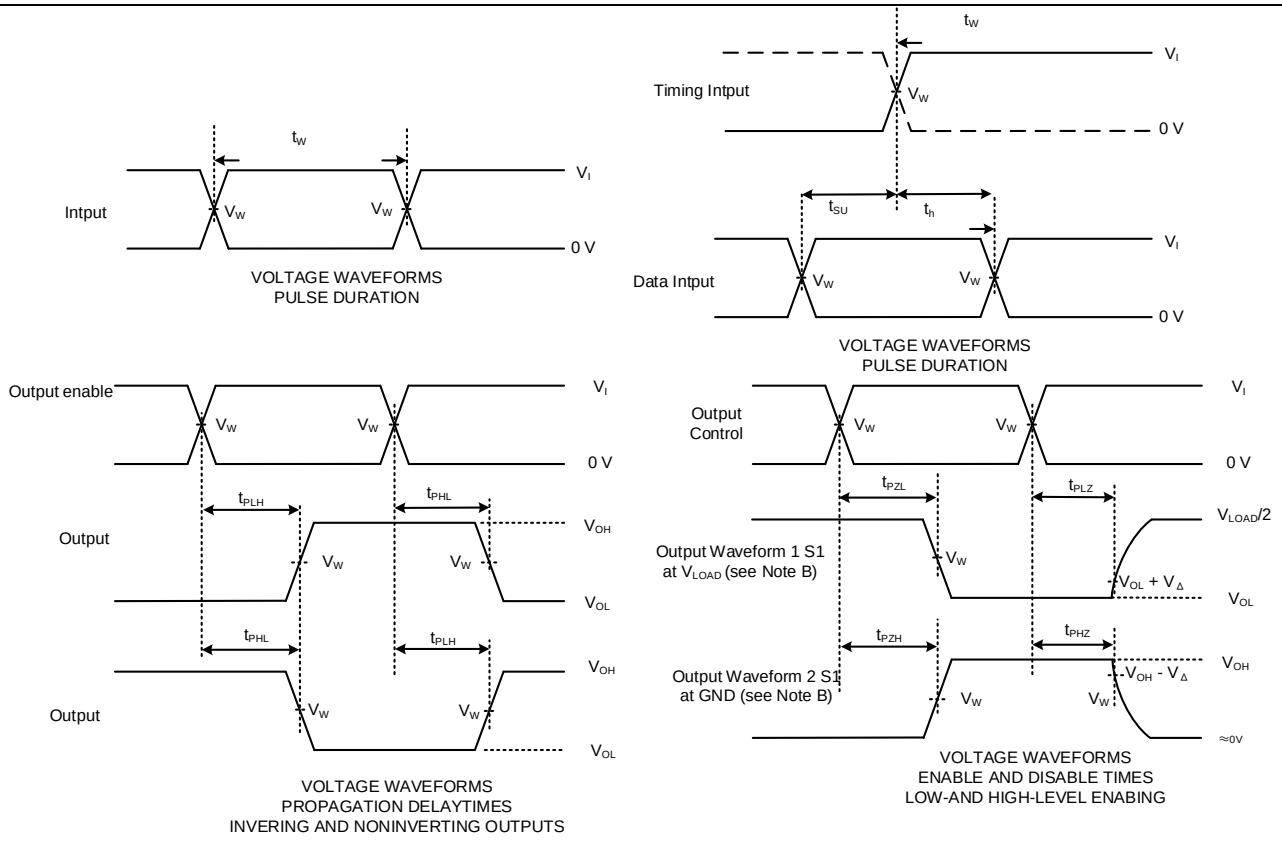
Symbol	Parameter	Condition	V_{CC}	Min	Typ	Max	Unit
C_{PD}	Power Dissipation Capacitance per Buffer and Driver	f = 10MHz, No Load	1.8V		17		pF
			2.5V		17		pF
			3.3V		17		pF
			5.5V		20		pF

Parameter measurement information



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

Figure.3 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}.

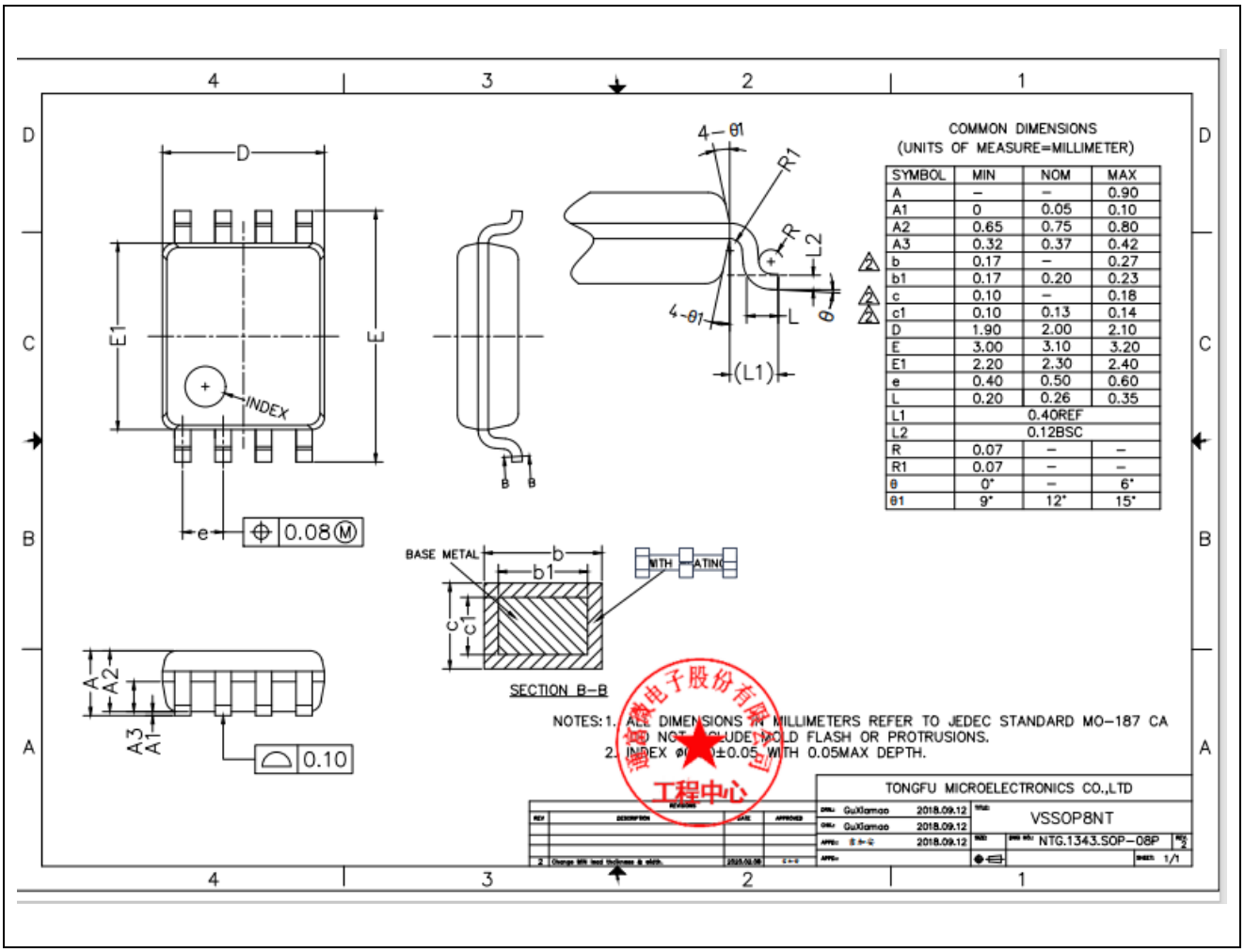
I. All parameters and waveforms are not applicable to all devices.

Figure.4 Input to output propagation delay times

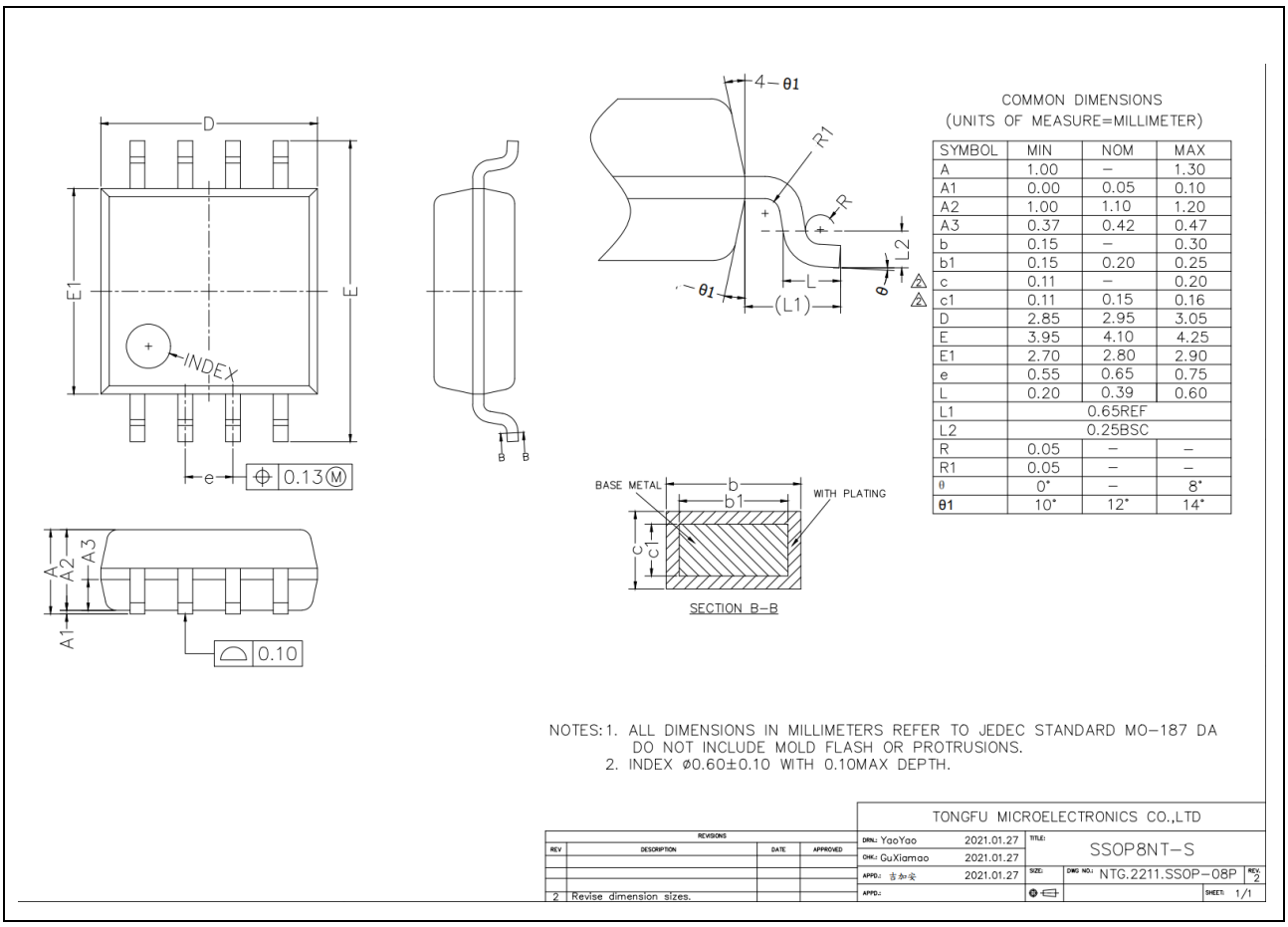
V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
1.8V ± 0.15V	V_{CC}	≤ 2ns	$V_{CC}/2$	2 × V_{CC}	30pF	1kΩ	0.15V
2.5V ± 0.2V	V_{CC}	≤ 2ns	$V_{CC}/2$	2 × V_{CC}	30pF	500Ω	0.15V
3.3V ± 0.3V	3V	≤ 2.5ns	1.5V	6V	50pF	500Ω	0.3V
5.5V ± 0.5V	V_{CC}	≤ 2.5ns	$V_{CC}/2$	2 × V_{CC}	50pF	500Ω	0.3V

Package Dimension

VSSOP8



SSOP8



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.00	–	1.30
A1	0.00	0.05	0.10
A2	1.00	1.10	1.20
A3	0.37	0.42	0.47
b	0.15	–	0.30
b1	0.15	0.20	0.25
c	0.11	–	0.20
c1	0.11	0.15	0.16
D	2.85	2.95	3.05
E	3.95	4.10	4.25
E1	2.70	2.80	2.90
e	0.55	0.65	0.75
L	0.20	0.39	0.60
L1	0.65REF		
L2	0.25BSC		
R	0.05	–	–
R1	0.05	–	–
θ	0°	–	8°
θ1	10°	12°	14°

NOTES: 1. ALL DIMENSIONS IN MILLIMETERS REFER TO JEDEC STANDARD MO−187 DA
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2. INDEX ø0.60±0.10 WITH 0.10MAX DEPTH.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
2	Revise dimension sizes.		

TONGFU MICROELECTRONICS CO.,LTD

DRN.: YaoYao	2021.01.27	TITLE:	SSOP8NT−S
CHK.: GuXiamao	2021.01.27	SIZE:	DWG NO.: NTG.2211.SSOP−08P REV. 2
APPD.: 吉加安	2021.01.27		
APPD.:			SHEET: 1/1

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2025-02-19	Preliminary Version	Wangar	Yangxx	Liujy
0.1	2025-04-29	Update Package	Wangar	Yangxx	Liujy