

Single 2-input Exclusive-OR Gate

General Description

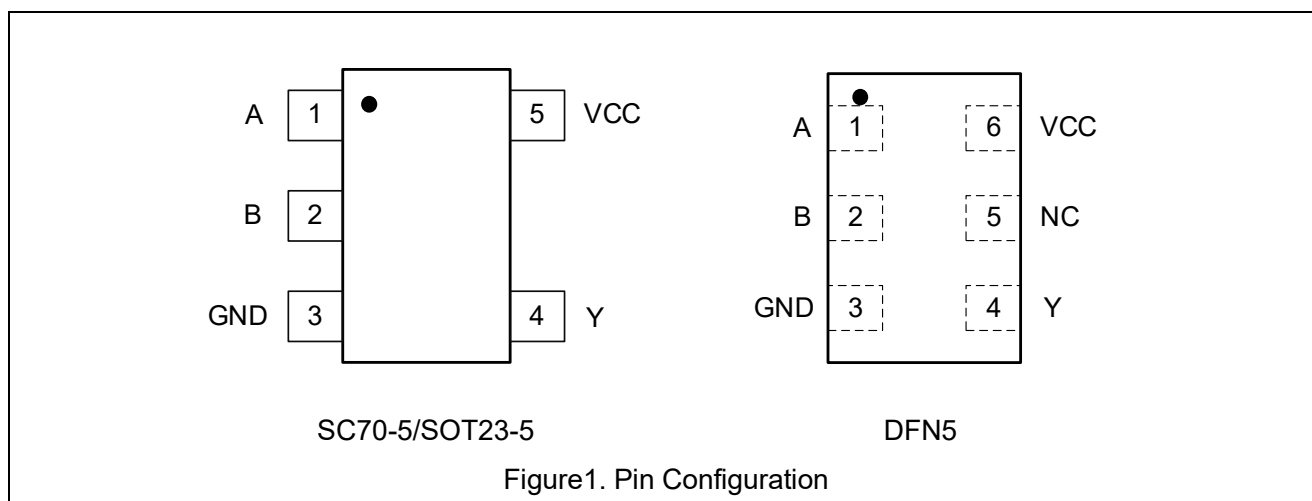
This device contains four independent 2-input XOR gates operating from a 1.65 to 5.5 V supply. Each gate performs the Boolean function $Y = A \oplus B$ in positive logic.

Features

- Designed for 1.65V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- $\pm 32\text{mA}$ Balanced Output Sink and Source Capability
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JESD22 Standard
 - HBM: $\pm 4000\text{V}$ Pass (JEDEC JS-001)
 - CDM: $\pm 1000\text{V}$ 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
ET74LVC1G86	SC70-5 (1.3mm $\times$ 2.1mm)	Tape and Reel, 3K/Reel	1
ET74LVC1G86T	SOT23-5 (1.6mm $\times$ 2.9mm)	Tape and Reel, 3K/Reel	3
ET74LVC1G86Y	DFN6 (1.0mm $\times$ 1.5mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



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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

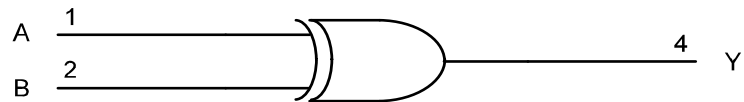


Figure2. Logic Symbol

Functional Table

Input		Output
A	B	Y
L	L	L
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		-0.5 to 6.5	V
V _I	DC Input Voltage ⁽¹⁾		-0.5 ≤ V _I ≤ 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 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	

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Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V _{CC}	DC Supply Voltage Operating		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	$V_{CC}(V)$	$T_A = 25^\circ C$			$-40^\circ C \leq T_A \leq 125^\circ C$		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High-Level Input Voltage		1.65~1.95 2.3~5.5	0.75 V_{CC} 0.7 V_{CC}			0.75 V_{CC} 0.7 V_{CC}		V
V_{IL}	Low-Level Input Voltage		1.65~1.95 2.3~5.5			0.25 V_{CC} 0.3 V_{CC}		0.25 V_{CC} 0.3 V_{CC}	V
V_{OH}	High-Level Output Voltage	$I_{OH} = -100\mu A$	1.65~5.5	$V_{CC} - 0.1$	V_{CC}		$V_{CC} - 0.1$		V
		$I_{OH} = -3mA$	1.65	1.29	1.4		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	$I_{OH} = 100\mu A$	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	

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DC Electrical Characteristics (Continued)

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
I _{IN}	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

AC Electrical Characteristics

t_r = t_f = 3ns

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	15.0	19.0	2.0	20.0	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}	5	pF
C _{PD}	Power Dissipation Capacitance ⁽⁵⁾	10MHz, V _{CC} = 3.3V, V _I = 0V or V _{CC}	21	pF
		10MHz, V _{CC} = 5.5V, V _I = 0V or V _{CC}	21	

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;

Σ(C_L × V_{CC}² × f_o) = sum of outputs.

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Waveform and Test Circuit

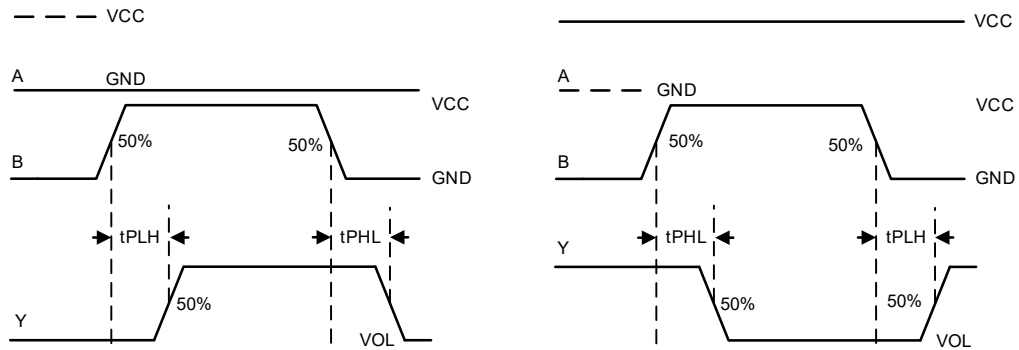


Figure3. Switching Waveform

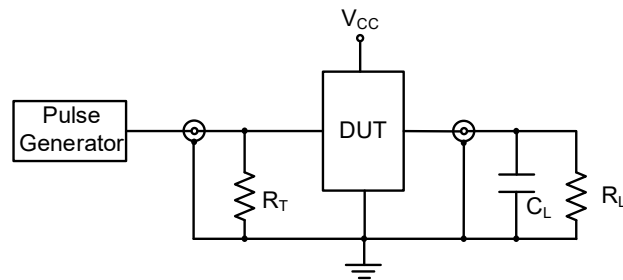
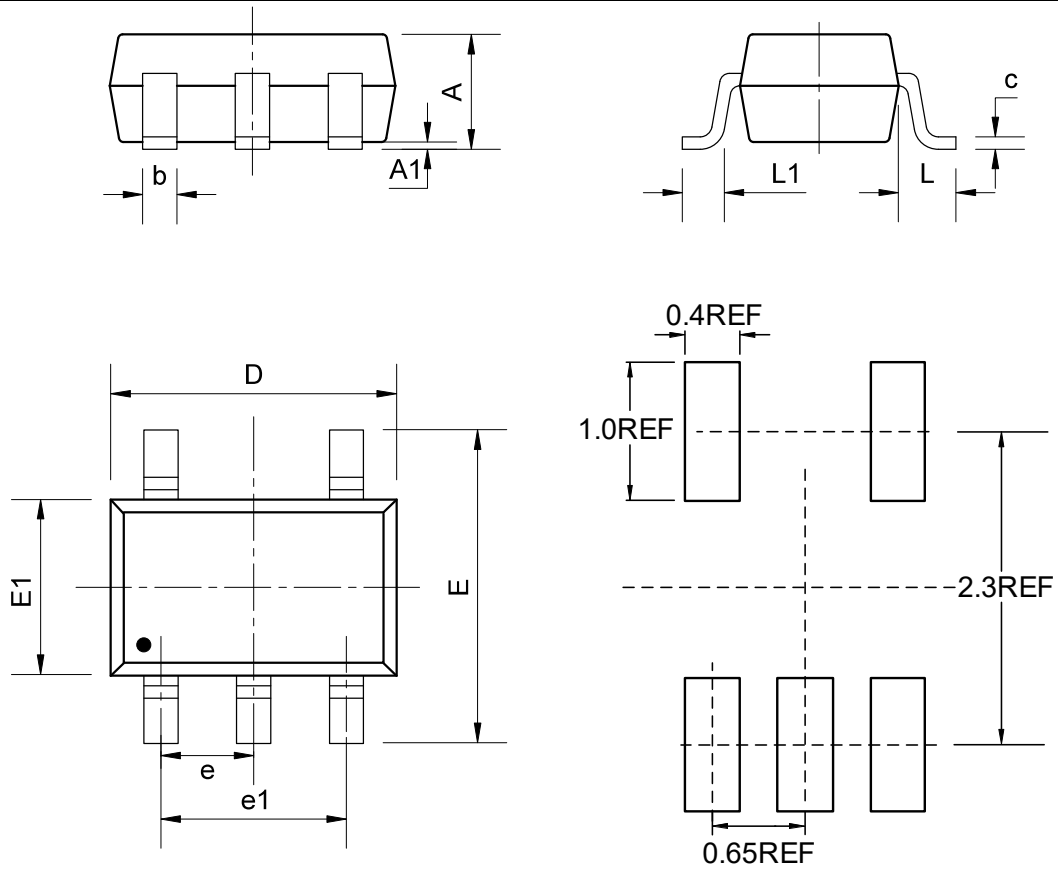


Figure4. Test Circuit

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Package Dimension

SC70-5 (1.3mm × 2.1mm)



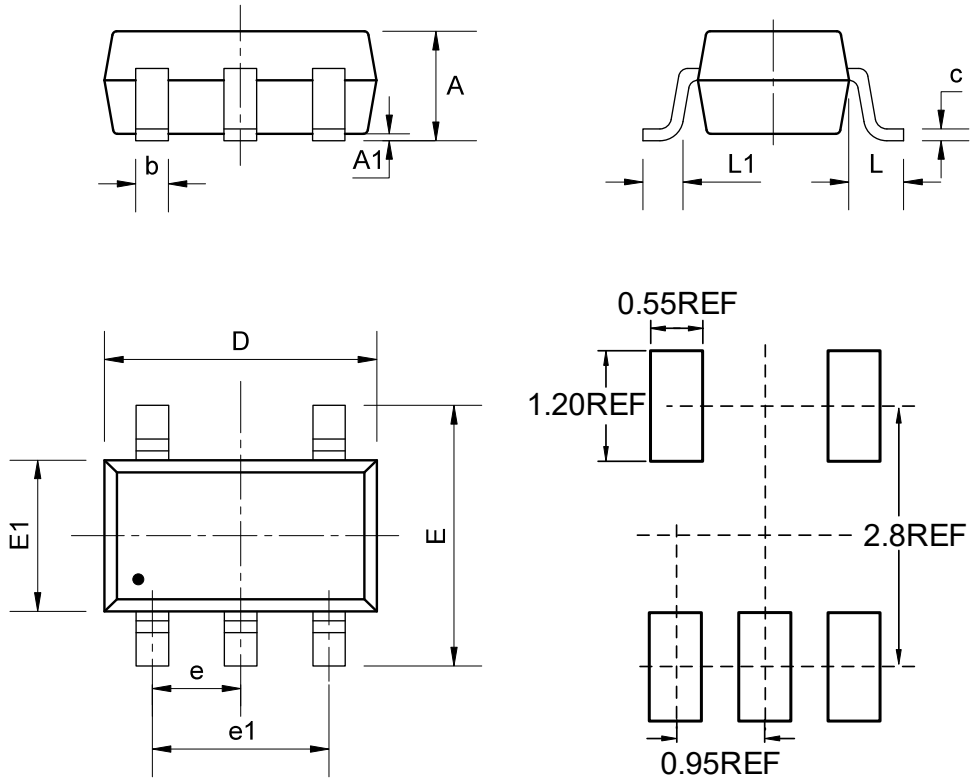
COMMON DIMENSIONS

(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)



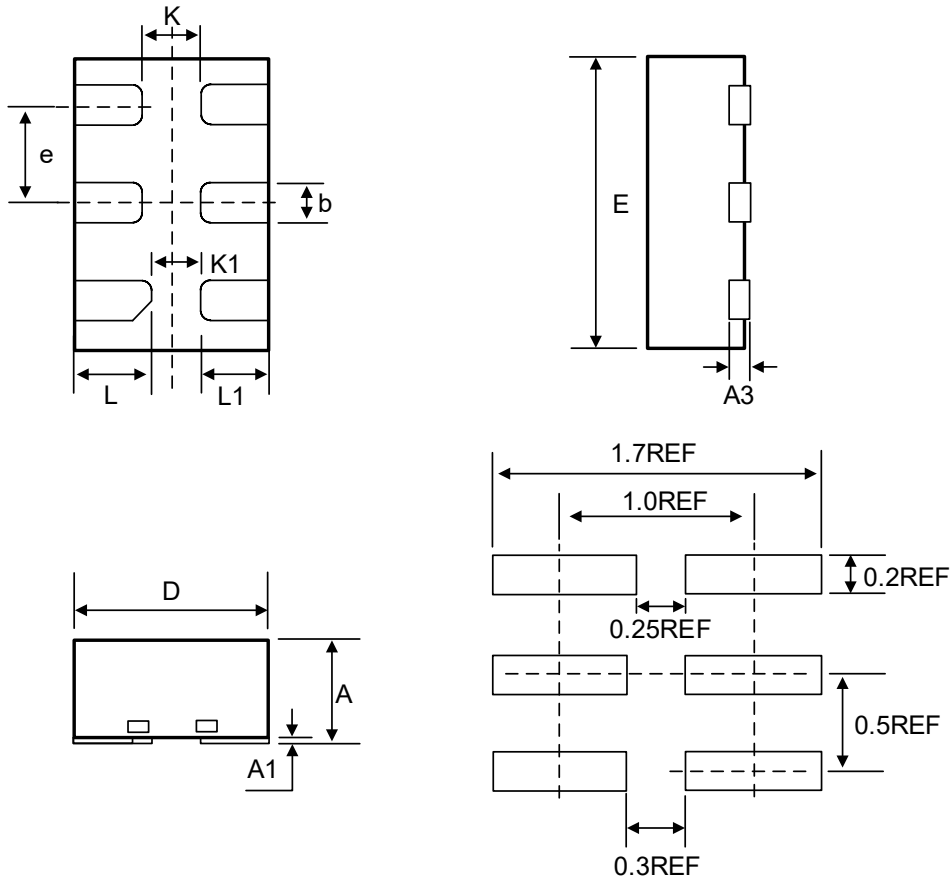
COMMON DIMENSIONS

(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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DFN6 (1.0mm × 1.5mm)



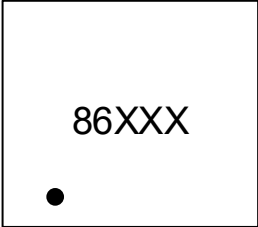
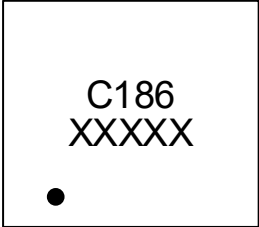
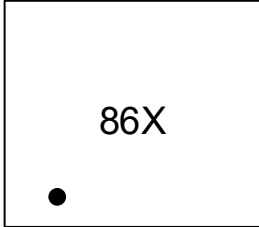
COMMON DIMENSIONS

(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

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Marking Information

		
ET74LVC1G86 86 = Part Number XXX = Tracking Number	ET74LVC1G86T C186 = Part Number XXXXX = Tracking Number	ET74LVC1G86Y 86 = Part Number X = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-07-17	Original Version	Ma yongjian	Ma yongjian	Liu jiaying
1.1	2019-07-18	Update AC Table and Device Information	Ma yongjian	Ma yongjian	Liu jiaying
1.2	2022-10-14	Update format and Thermal Characteristics	Shi bo	Shi bo	Liu jiaying
1.3	2023-11-29	Update Typeset /ESD/package picture	Shi bo	Shi bo	Liu jiaying
1.4	2025-05-30	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.5	2025-09-18	Update AC Table	Wang anran	Yang xiaoxu	Liu jiaying
1.6	2026-04-17	Update Format, Add Tape and Marking	Xu tao	Yang xiaoxu	Liu jiaying