74AUP1T34
1-Bit Unidirectional Voltage-Level Translator

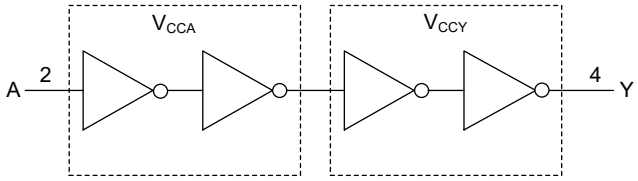
GENERAL DESCRIPTION

The 74AUP1T34 device is a 1-bit non-inverting translator that is unidirectional from A to Y. The device has two separate configurable power-supply rails. The A and Y ports track the V_{CCA} supply and V_{CCY} supply respectively. The supply voltage pins accept any voltage from 0.9V to 3.6V, making the device suitable for low voltage translation voltage nodes of 1V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V.

This device is highly suitable for partial power-down applications by using power-off leakage current (I_{OFF}) circuit. When the device is powered down, the output is disabled, and the current backflow can be prevented from passing through the device. The supply voltage has a function of isolation that allows the Y port to enter high-impedance state when V_{CCA} input is at GND. When V_{CCY} input is at GND, there is no leakage current or floating caused by the V_{CCA} input.

The 74AUP1T34 is available in a Green SC70-5 package. It operates over an ambient temperature range of -40℃ to +125℃.

LOGIC DIAGRAM



FEATURES

- **Wide Operating Voltage Range: 0.9V to 3.6V**
- **Input Accept Voltage Higher than the Supply Voltage**
- **+6mA/-6mA Output Current**
- **Low Static Power Dissipation: I_{CC} = 2μA (TYP)**
- **No Sink/Source Current for I/O Ports in Power-Down Mode**
- **Input with Schmitt-Trigger**
- **Output in High-Impedance State when V_{CCA} = 0V**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SC70-5 Package**

APPLICATIONS

Enterprise and Industrial Devices
Telecommunications
Personal Electronics

FUNCTION TABLE

INPUT	OUTPUT
A Port	Y Port
L	L
H	H

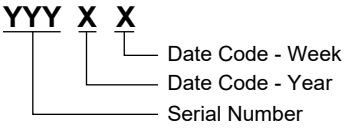
H = High Voltage Level
L = Low Voltage Level

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74AUP1T34	SC70-5	-40℃ to +125℃	74AUP1T34XC5G/TR	08FXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage Range
V_{CCA} ..... -0.5V to 4.6V
V_{CCY} ..... -0.5V to 4.6V
Input Voltage Range, V_I (2) ..... -0.5V to 4.6V
Output Voltage Range, V_O (2)
Active Mode or Power-Off State..... -0.5V to 4.6V
Input Clamp Current, I_{IK} (V_I < 0V).....-50mA
Output Clamp Current, I_{OK} (V_O < 0V).....-50mA
Continuous Output Current, I_O ..... ±50mA
Continuous Current through V_{CCA} or GND ..... ±100mA
Junction Temperature (3) .....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility
HBM.....7000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range
V_{CCA} .....0.9V to 3.6V
V_{CCY} .....0.9V to 3.6V
Input Voltage Range, V_I.....0V to 3.6V
Output Voltage Range, V_O
Active Mode .....0V to V_{CCY}
Power-Off State .....0V to 3.6V
Output Current, I_O ..... ±6mA
Input Transition Rise or Fall Rate, Δt/ΔV ..... 200ns/V (MAX)
Operating Temperature Range .....-40℃ to +125℃

OVERSTRESS CAUTION

1. Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

2. The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.

3. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

ESD SENSITIVITY CAUTION

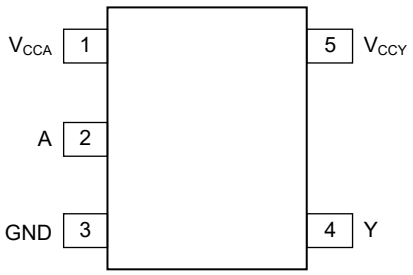
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



SC70-5

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	V_{CCA}	Supply Voltage for Input Port.
2	A	Data Input.
3	GND	Ground.
4	Y	Data Output.
5	V_{CCY}	Supply Voltage for Output Port.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
High-Level Input Voltage	V_{IH}	V_{CCA} = 0.9V to 1.95V		Full	0.65 × V_{CCA}			V
		V_{CCA} = 2.3V to 2.7V		Full	1.6			
		V_{CCA} = 3.0V to 3.6V		Full	2.0			
Low-Level Input Voltage	V_{IL}	V_{CCA} = 0.9V to 1.95V		Full			0.30 × V_{CCA}	V
		V_{CCA} = 2.3V to 2.7V		Full			0.7	
		V_{CCA} = 3.0V to 3.6V		Full			0.9	
High-Level Output Voltage	V_{OH}	V_{CCY} = 0.9V to 3.6V, I_{OH} = -100μA		Full	V_{CCY} - 0.2	V_{CCY} - 0.02		V
		V_{CCY} = 0.9V to 1.0V, I_{OH} = -0.25mA		Full	0.75 × V_{CCY}	V_{CCY} - 0.02		
		V_{CCY} = 1.2V, I_{OH} = -1.5mA		Full	1.00	1.14		
		V_{CCY} = 1.65V, I_{OH} = -2mA		Full	1.32	1.59		
		V_{CCY} = 2.3V, I_{OH} = -3mA		Full	1.90	2.23		
		V_{CCY} = 3.0V, I_{OH} = -6mA		Full	2.72	2.88		
Low-Level Output Voltage	V_{OL}	V_{CCY} = 0.9V to 3.6V, I_{OL} = 100μA		Full		0.01	0.10	V
		V_{CCY} = 0.9V to 1.0V, I_{OL} = 0.25mA		Full		0.02	0.10	
		V_{CCY} = 1.2V, I_{OL} = 1.5mA		Full		0.06	0.3 × V_{CCY}	
		V_{CCY} = 1.65V, I_{OL} = 2mA		Full		0.06	0.31	
		V_{CCY} = 2.3V, I_{OL} = 3mA		Full		0.08	0.31	
		V_{CCY} = 3.0V, I_{OL} = 6mA		Full		0.14	0.31	
Input Leakage Current	I_I	V_{CCA} = 0V to 3.6V, V_I = 3.6V or GND		Full		±0.01	±1	μA
Off-State Output Current	I_{OZ}	V_{CCA} = 0V, V_{CCY} = 3.6V, V_O = 3.6V or GND		Full		±0.01	±5	μA
Power-Off Leakage Current	I_{OFF}	V_{CCY} = 0V, V_{CCA} = 0.9V to 3.6V, V_O = 3.6V or GND		Full		±0.01	±5	μA
V_{CCA} Supply Current	I_{CCA}	V_I = V_{CCI} or GND, I_O = 0mA	V_{CCA} = 0.9V to 3.6V, V_{CCY} = 0.9V to 3.6V	Full		0.50	5	μA
			V_{CCA} = 0.9V to 3.6V, V_{CCY} = V_{CCA}	Full		0.01	2	
			V_{CCA} = 0V, V_{CCY} = 0V to 3.6V	Full		0.01	1	
			V_{CCY} = 0V, V_{CCA} = 0V to 3.6V	Full		0.01	1	
V_{CCY} Supply Current	I_{CCY}	V_I = V_{CCI} or GND, I_O = 0mA	V_{CCA} = 0.9V to 3.6V, V_{CCY} = 0.9V to 3.6V	Full		2	5	μA
			V_{CCA} = 0.9V to 3.6V, V_{CCY} = V_{CCA}	Full		0.5	2	
			V_{CCA} = 0V, V_{CCY} = 0V to 3.6V	Full		0.2	1	
			V_{CCY} = 0V, V_{CCA} = 0V to 3.6V	Full		0.01	1	
Combined Supply Current	I_{CCA} + I_{CCY}	V_{CCA} = 0.9V to 3.6V, V_{CCY} = 0.9V to 3.6V, V_I = V_{CCI} or GND, I_O = 0mA		Full		2	5.2	μA
Input Capacitance	C_I	V_{CCA} = V_{CCY} = 3.3V, V_I = 3.3V or GND		+25℃		5		pF
Input/Output Capacitance	$C_{I/O}$	A or Y port, V_{CCA} = 0V, V_{CCY} = 3.3V, V_O = 3.3V or GND		+25℃		5		pF

DYNAMIC CHARACTERISTICS

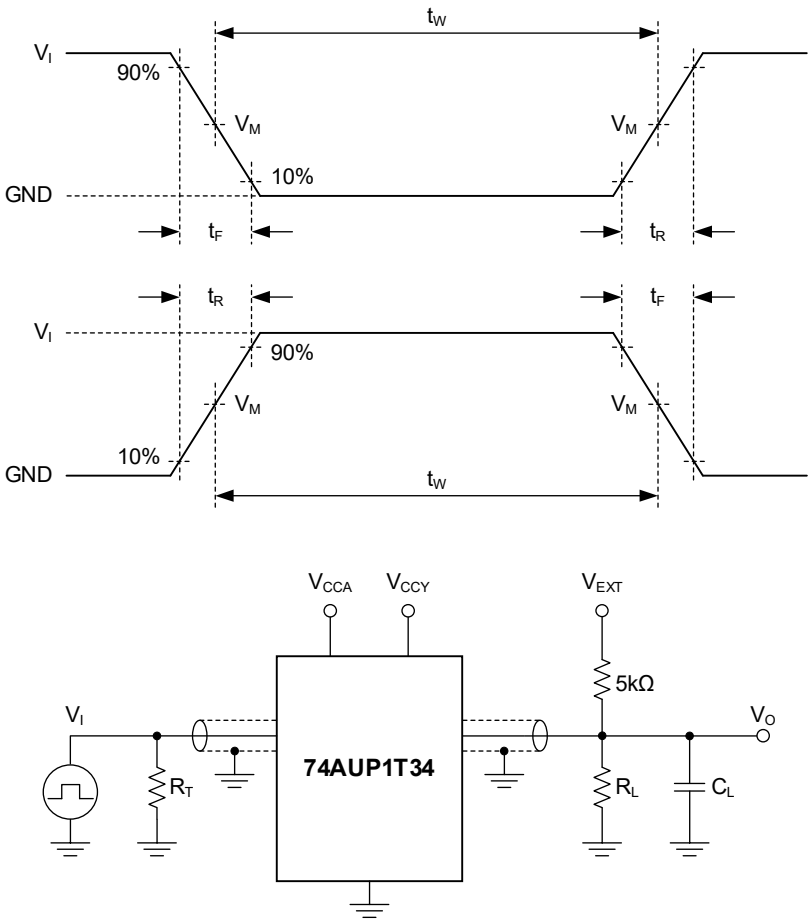
(See Figure 1 for test circuit. Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN (1)	TYP	MAX (1)	UNITS
Low-to-High/High-to-Low Propagation Delay	t_{PLH}/t_{PHL}	C_L = 30pF, V_{CCA} = 0.9V	V_{CCY} = 0.9V	Full		18.0		ns
			V_{CCY} = 1.2V	Full		12.5		
			V_{CCY} = 1.65V	Full		11.0		
			V_{CCY} = 2.3V	Full		11.0		
			V_{CCY} = 3.0V	Full		11.0		
		C_L = 30pF, V_{CCA} = 1.2V	V_{CCY} = 0.9V	Full	1.0	14.0	110	
			V_{CCY} = 1.2V	Full	0.5	8.0	18.5	
			V_{CCY} = 1.65V	Full	0.5	6.5	13.5	
			V_{CCY} = 2.3V	Full	0.5	6.0	11.5	
			V_{CCY} = 3.0V	Full	0.5	6.0	11.5	
		C_L = 30pF, V_{CCA} = 1.65V	V_{CCY} = 0.9V	Full	1.0	12.5	105	
			V_{CCY} = 1.2V	Full	0.5	6.5	15.0	
			V_{CCY} = 1.65V	Full	0.5	5.0	9.5	
			V_{CCY} = 2.3V	Full	0.5	4.5	8.0	
			V_{CCY} = 3.0V	Full	0.5	4.0	7.5	
		C_L = 30pF, V_{CCA} = 2.3V	V_{CCY} = 0.9V	Full	1.0	11.5	105	
			V_{CCY} = 1.2V	Full	0.5	5.5	13.5	
			V_{CCY} = 1.65V	Full	0.5	4.0	8.5	
			V_{CCY} = 2.3V	Full	0.5	3.5	6.5	
			V_{CCY} = 3.0V	Full	0.5	3.0	6.0	
		C_L = 30pF, V_{CCA} = 3.0V	V_{CCY} = 0.9V	Full	1.0	11.0	105	
			V_{CCY} = 1.2V	Full	0.5	5.5	13.0	
			V_{CCY} = 1.65V	Full	0.5	3.5	8.0	
			V_{CCY} = 2.3V	Full	0.5	3.0	6.0	
			V_{CCY} = 3.0V	Full	0.5	2.5	5.5	

NOTE:

1. Specified by design and characterization, not production tested.

TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

R_L: Load resistance.

C_L: Load capacitance (includes jig and probe).

R_T: Termination resistance (equals to output impedance Z_O of the pulse generator).

V_{EXT}: External voltage is used to measure switching time.

Figure 1. Test Circuit for Measuring Switching Times

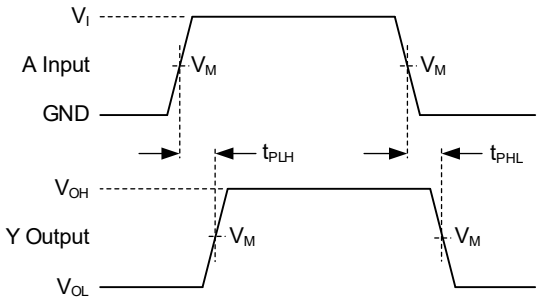
Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CCA}, V_{CCY}	V_I	t_R, t_F	C_L	R_L (1) (2)	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
0.9V to 3.6V	V_{CCA}	≤ 2.0ns	30pF	5kΩ, 1MΩ	Open	GND	2 × V_{CC}

NOTES:

1. R_L = 5kΩ is used to measure enable and disable times.
2. R_L = 1MΩ is used to measure propagation delays, setup and hold times and pulse width.

WAVEFORMS



Test conditions are given in Table 1.
Measurement points are given in Table 2.
Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 2. Input A to Output Y Propagation Delay Times

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
V_{CCA}, V_{CCY}	V_I	V_M (1)	V_M
0.9V to 3.6V	V_{CCA}	0.5 × V_{CCA}	0.5 × V_{CCY}

NOTE:
1. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 2.0ns.

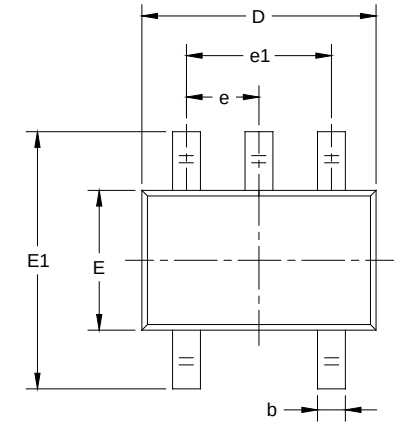
REVISION HISTORY

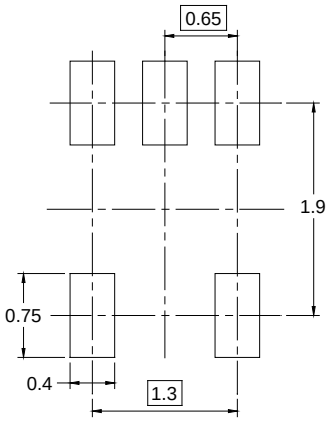
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (DECEMBER 2023) to REV.A	Page
Changed from product preview to production data	All

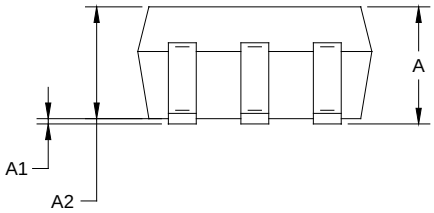
PACKAGE OUTLINE DIMENSIONS

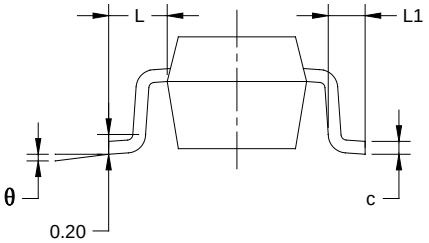
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)



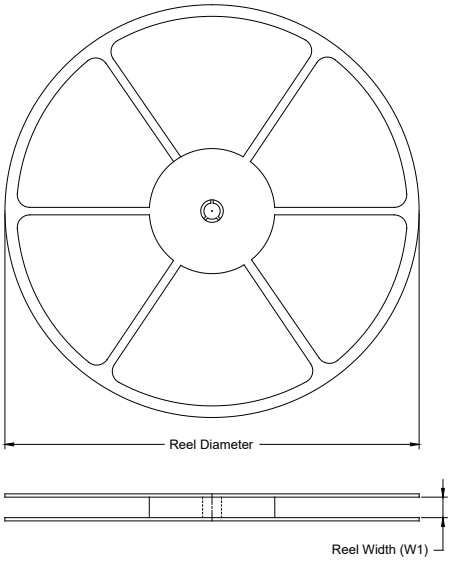


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

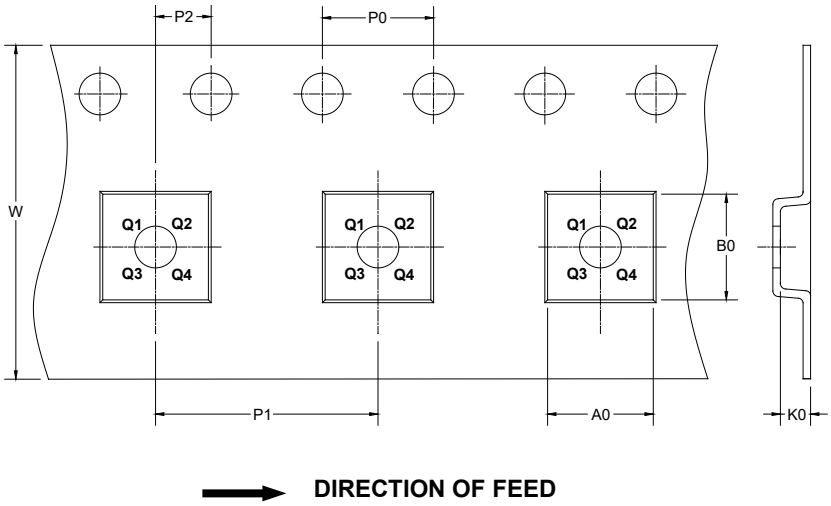
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



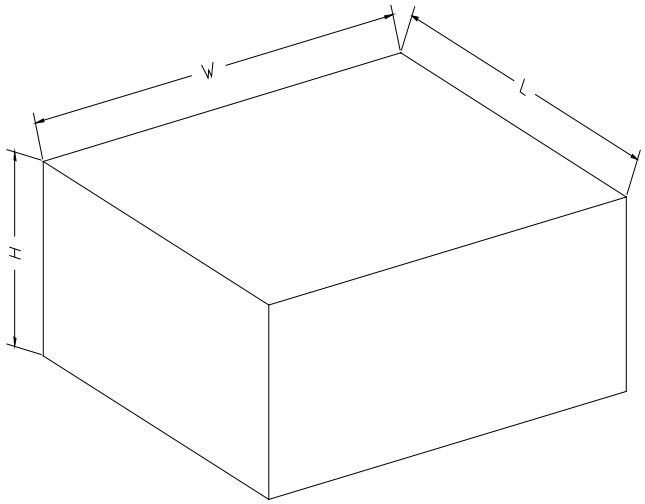
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-5	7″	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002