74AUP1G02
Low Power Single 2-Input Positive-NOR Gate

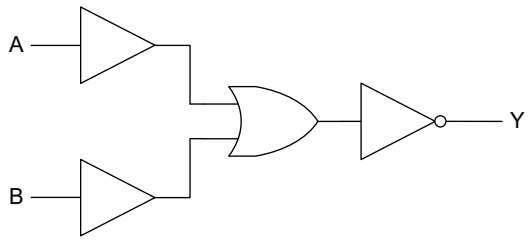
GENERAL DESCRIPTION

The 74AUP1G02 is a low power single 2-input positive-NOR gate which can accept supply voltage range from 0.8V to 3.6V. All of the inputs support Schmitt-Trigger action. The device features low static and dynamic power dissipation over the wide supply voltage range and implements Boolean function $Y=\overline{A+B}$ or $Y=\overline{A}\times\overline{B}$.

This device is highly suitable for partial power-down applications by using power-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 74AUP1G02 is available in Green SC70-5, SOT-23-5, XTDFN-1×1-6L and UTDFN-1.45×1-6AL packages. It operates over a temperature range of -40℃ to +125℃.

LOGIC DIAGRAM



FEATURES

- **Wide Supply Voltage Range: 0.8V to 3.6V**
- **Inputs Accept Voltages Higher than the Supply Voltage and up to 3.6V**
- **Low Static Power Dissipation: I_{CC} = 0.9μA (MAX)**
- **Low Dynamic Power Dissipation: C_{PD} = 6.5pF (TYP) at V_{CC} = 3.3V**
- **All Inputs with Schmitt-Trigger**
- **Support Partial Power-Down Mode**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SC70-5, SOT-23-5, XTDFN-1×1-6L and UTDFN-1.45×1-6AL Packages**

APPLICATIONS

Computing Equipment
Telecom Equipment
Industrial Equipment
Medical Equipment
Battery Powered Equipment

FUNCTION TABLE

INPUT		OUTPUT
A	B	Y
L	L	H
H	*X*	L
X	H	L

$Y=\overline{A+B}$ or $Y=\overline{A}\times\overline{B}$

H = High Voltage Level

L = Low Voltage Level

X = Don't Care

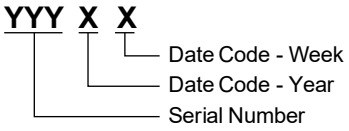
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74AUP1G02	SC70-5	-40℃ to +125℃	74AUP1G02XC5G/TR	0YWXX	Tape and Reel, 3000
	SOT-23-5	-40℃ to +125℃	74AUP1G02XN5G/TR	1FR XXXXX	Tape and Reel, 3000
	XTDFN-1×1-6L	-40℃ to +125℃	74AUP1G02XXDM6G/TR	BX	Tape and Reel, 5000
	UTDFN-1.45×1-6AL	-40℃ to +125℃	74AUP1G02XUDL6G/TR	16X	Tape and Reel, 5000

MARKING INFORMATION

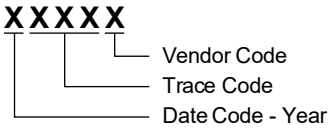
SC70-5

(1) XX = Date Code.



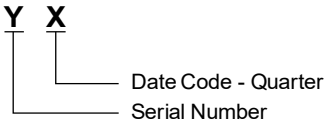
SOT-23-5

(2) XXXXX = Date Code, Trace Code and Vendor Code.



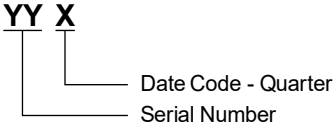
XTDFN-1×1-6L

(3) X = Date Code.



UTDFN-1.45×1-6AL

(4) X = 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

Supply Voltage Range, V_{CC} ..... -0.5V to 4.6V
Input Voltage Range, V_I (1) ..... -0.5V to 4.6V
Output Voltage Range, V_O (1)
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 .....±20mA
Continuous Current through V_{CC} or GND.....±50mA
Junction Temperature (2) .....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility (3) (4)
HBM.....±7000V
CDM .....±1000V

NOTES:

1. The input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.

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

3. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.

4. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

5. Unused input pins must be held at V_{CC} or GND to guarantee the device in normal operation.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CC}.....0.8V to 3.6V
Input Voltage Range, V_I (5) .....0V to 3.6V
Output Voltage Range, V_O
Active Mode.....0V to V_{CC}
Power-Off State .....0V to 3.6V
Input Transition Rise or Fall Rate, Δt/ΔV..... 100ns/V (MAX)
Operating Temperature Range..... -40℃ to +125℃

OVERSTRESS CAUTION

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.

ESD SENSITIVITY CAUTION

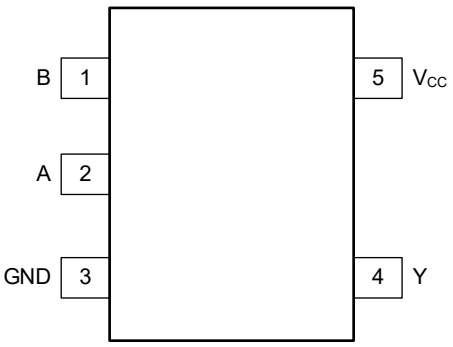
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

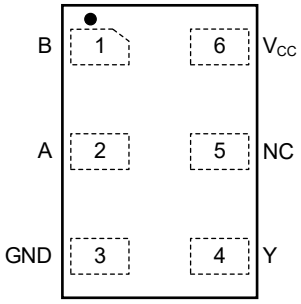
PIN CONFIGURATIONS

(TOP VIEW)



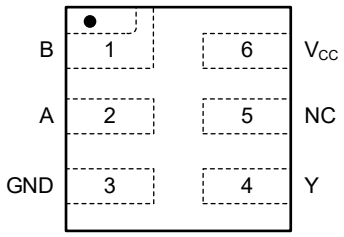
SC70-5/SOT-23-5

(TOP VIEW)



UTDFN-1.45×1-6AL

(TOP VIEW)



XTDFN-1×1-6L

PIN DESCRIPTION

PIN		NAME	FUNCTION
SC70-5/SOT-23-5	XTDFN-1×1-6L/ UTDFN-1.45×1-6AL		
1	1	B	Data Input.
2	2	A	Data Input.
3	3	GND	Ground.
4	4	Y	Data Output.
—	5	NC	No Connection.
5	6	V_{CC}	Supply Voltage.

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_{CC} = 0.8V	Full	0.70 × V_{CC}			V
		V_{CC} = 0.9V to 1.95V	Full	0.65 × V_{CC}			
		V_{CC} = 2.3V to 2.7V	Full	1.6			
		V_{CC} = 3.0V to 3.6V	Full	2.0			
Low-Level Input Voltage	V_{IL}	V_{CC} = 0.8V	Full			0.30 × V_{CC}	V
		V_{CC} = 0.9V to 1.95V	Full			0.30 × V_{CC}	
		V_{CC} = 2.3V to 2.7V	Full			0.7	
		V_{CC} = 3.0V to 3.6V	Full			0.9	
High-Level Output Voltage	V_{OH}	V_{CC} = 0.8V to 3.6V, I_{OH} = -20μA	Full	V_{CC} - 0.1	V_{CC} - 0.01		V
		V_{CC} = 1.1V, I_{OH} = -1.1mA	Full	0.70 × V_{CC}	0.99		
		V_{CC} = 1.4V, I_{OH} = -1.7mA	Full	1.03	1.28		
		V_{CC} = 1.65V, I_{OH} = -1.9mA	Full	1.30	1.54		
		V_{CC} = 2.3V, I_{OH} = -2.3mA	Full	1.97	2.19		
		V_{CC} = 2.3V, I_{OH} = -3.1mA	Full	1.85	2.15		
		V_{CC} = 3.0V, I_{OH} = -2.7mA	Full	2.67	2.89		
		V_{CC} = 3.0V, I_{OH} = -4.0mA	Full	2.55	2.84		
Low-Level Output Voltage	V_{OL}	V_{CC} = 0.8V to 3.6V, I_{OL} = 20μA	Full		0.01	0.10	V
		V_{CC} = 1.1V, I_{OL} = 1.1mA	Full		0.09	0.30 × V_{CC}	
		V_{CC} = 1.4V, I_{OL} = 1.7mA	Full		0.10	0.37	
		V_{CC} = 1.65V, I_{OL} = 1.9mA	Full		0.10	0.35	
		V_{CC} = 2.3V, I_{OL} = 2.3mA	Full		0.10	0.33	
		V_{CC} = 2.3V, I_{OL} = 3.1mA	Full		0.14	0.45	
		V_{CC} = 3.0V, I_{OL} = 2.7mA	Full		0.11	0.33	
		V_{CC} = 3.0V, I_{OL} = 4.0mA	Full		0.16	0.45	
Input Leakage Current	I_I	A or B input, V_{CC} = 0V to 3.6V, V_I = GND to 3.6V	Full		±0.01	±0.5	μA
Power-Off Leakage Current	I_{OFF}	V_{CC} = 0V, V_I or V_O = 0V to 3.6V	Full		±0.01	±0.5	μA
Additional Power-Off Leakage Current	ΔI_{OFF}	V_{CC} = 0V to 0.2V, V_I or V_O = 0V to 3.6V	Full		±0.01	±0.6	μA
Supply Current	I_{CC}	V_{CC} = 0.8V to 3.6V, V_I = GND or V_{CC} to 3.6V, I_O = 0A	Full		0.1	0.9	μA
Additional Supply Current	ΔI_{CC}	One input at V_{CC} - 0.6V, other input at V_{CC} or GND, V_{CC} = 3.3V, V_I = V_{CC} - 0.6V, I_O = 0A	Full		1	50	μA
Input Capacitance	C_I	V_{CC} = 0V, V_I = V_{CC} or GND	+25℃		5		pF
		V_{CC} = 3.6V, V_I = V_{CC} or GND	+25℃		5		
Output Capacitance	C_O	V_{CC} = 0V, V_O = GND	+25℃		4.5		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
Propagation Delay (2)	t_{PD}	A or B to Y, C_L = 30pF	V_{CC} = 0.8V	+25℃		40.0		ns
			V_{CC} = 1.2V ± 0.1V	Full	1.0	14.5	42.5	
			V_{CC} = 1.5V ± 0.1V	Full	0.5	9.5	18.0	
			V_{CC} = 1.8V ± 0.15V	Full	0.5	7.5	13.5	
			V_{CC} = 2.5V ± 0.2V	Full	0.5	5.5	9.4	
			V_{CC} = 3.3V ± 0.3V	Full	0.5	5.0	8.0	
Power Dissipation Capacitance (3)	C_{PD}	f = 10MHz	V_{CC} = 0.8V	+25℃		6.5		pF
			V_{CC} = 1.2V ± 0.1V	+25℃		6.5		
			V_{CC} = 1.5V ± 0.1V	+25℃		6.5		
			V_{CC} = 1.8V ± 0.15V	+25℃		6.5		
			V_{CC} = 2.5V ± 0.2V	+25℃		6.5		
			V_{CC} = 3.3V ± 0.3V	+25℃		6.5		

NOTES:

1. Specified by design and characterization, not production tested.
2. t_{PD} is the same as t_{PLH} and t_{PHL}.
3. 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.

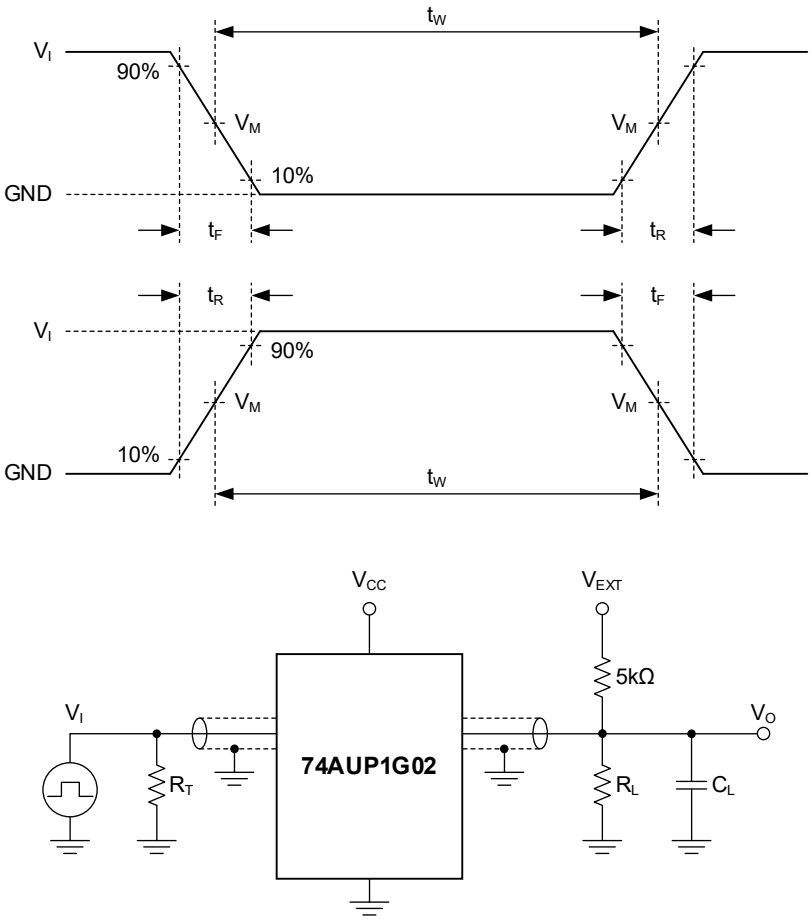
   C_L = Output load capacitance in pF.

   V_{CC} = Supply voltage in Volts.

   N = Number of inputs switching.

   $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of the outputs.

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

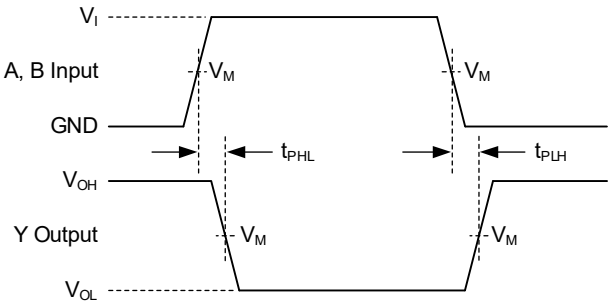
SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CC}	V_I	t_R, t_F	C_L	R_L (1) (2)	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
0.8V to 3.6V	V_{CC}	≤ 3.0ns	30pF	5kΩ, 1MΩ	Open	GND	2 × V_{CC}

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, B) to Output (Y) Propagation Delay Times

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
V_{CC}	V_I	V_M (1)	V_M
0.8V to 3.6V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}

NOTE:

1. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 3.0ns.

REVISION HISTORY

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

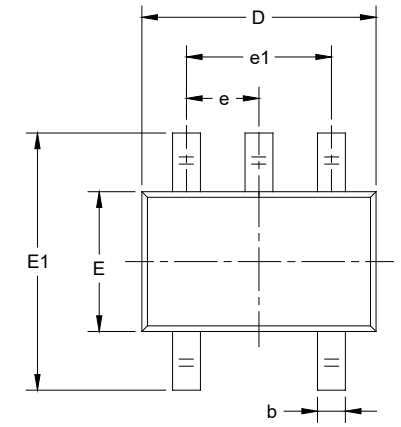
DECEMBER 2025 – REV.A.1 to REV.A.2	Page
Added UTDFN-1.45×1-6AL package	All

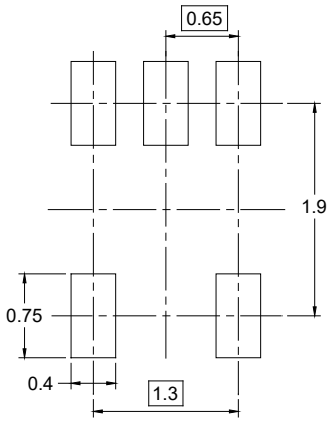
OCTOBER 2024 – REV.A to REV.A.1	Page
Added XTDFN-1×1-6L package	All

Changes from Original (SEPTEMBER 2024) to REV.A	Page
Changed from product preview to production data	All

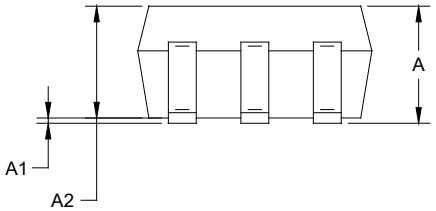
PACKAGE OUTLINE DIMENSIONS

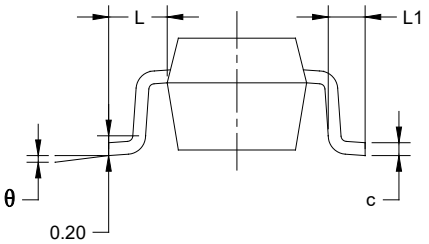
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)



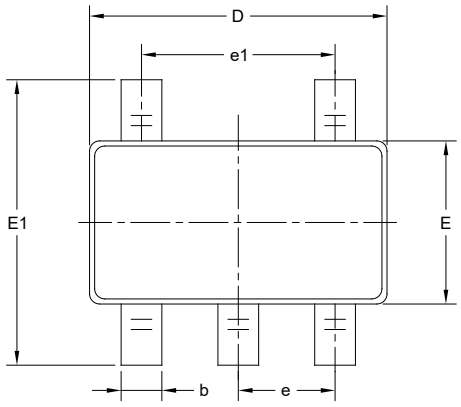


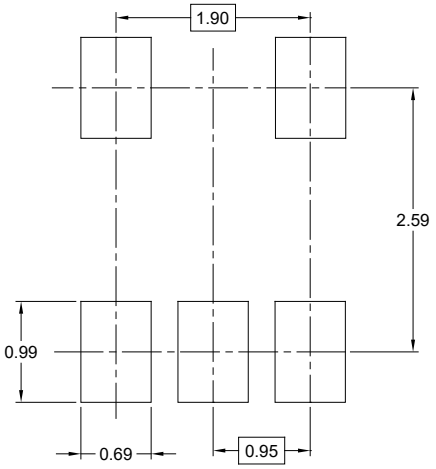
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 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.

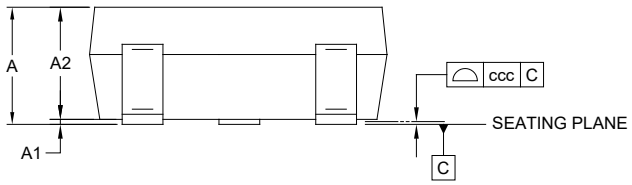
PACKAGE OUTLINE DIMENSIONS

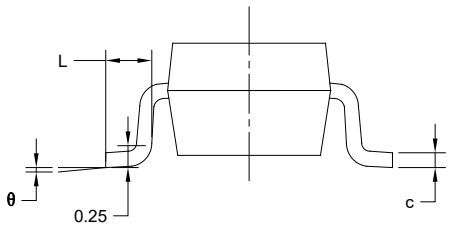
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)



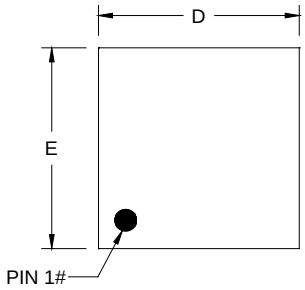


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
θ	0°	-	8°
ccc	0.100		

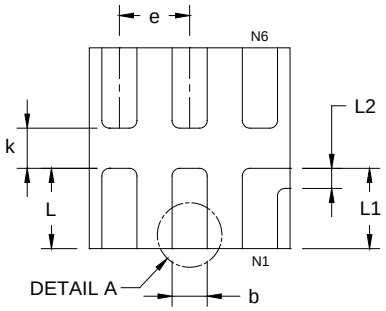
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

PACKAGE OUTLINE DIMENSIONS

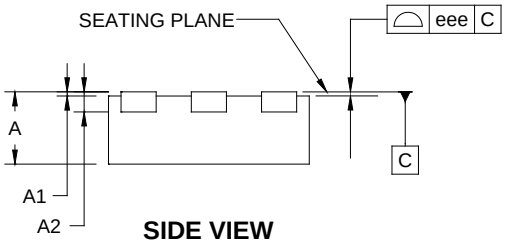
XTDFN-1×1-6L



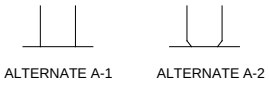
TOP VIEW



BOTTOM VIEW

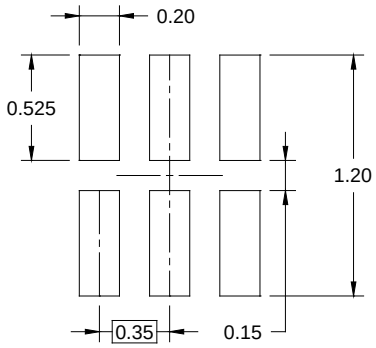


SIDE VIEW



DETAIL A

ALTERNATE TERMINAL CONSTRUCTION



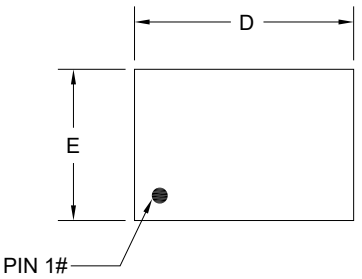
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.320	-	0.400
A1	0.000	-	0.050
A2	0.100 REF		
b	0.120	-	0.230
D	0.950	-	1.050
E	0.950	-	1.050
e	0.350 BSC		
k	0.150 MIN		
L	0.350	-	0.450
L1	0.350	-	0.450
L2	0.100 REF		
eee	0.050		

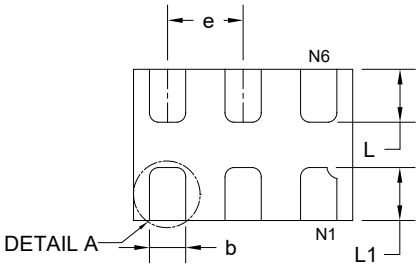
NOTE: This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

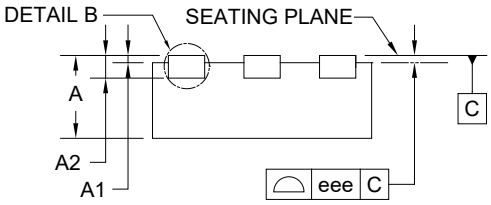
UTDFN-1.45×1-6AL



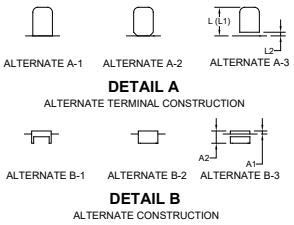
TOP VIEW

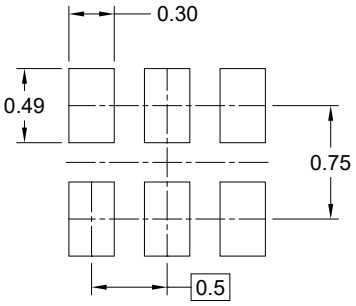


BOTTOM VIEW



SIDE VIEW





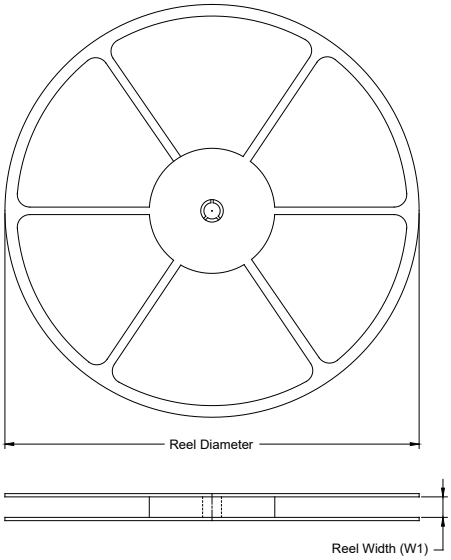
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.450	-	0.600
A1	-0.004	-	0.050
A2	0.150 REF		
b	0.150	-	0.300
D	1.374	-	1.526
E	0.924	-	1.076
e	0.500 BSC		
L	0.250	-	0.450
L1	0.250	-	0.500
L2	0.000	-	0.100
eee	0.050		

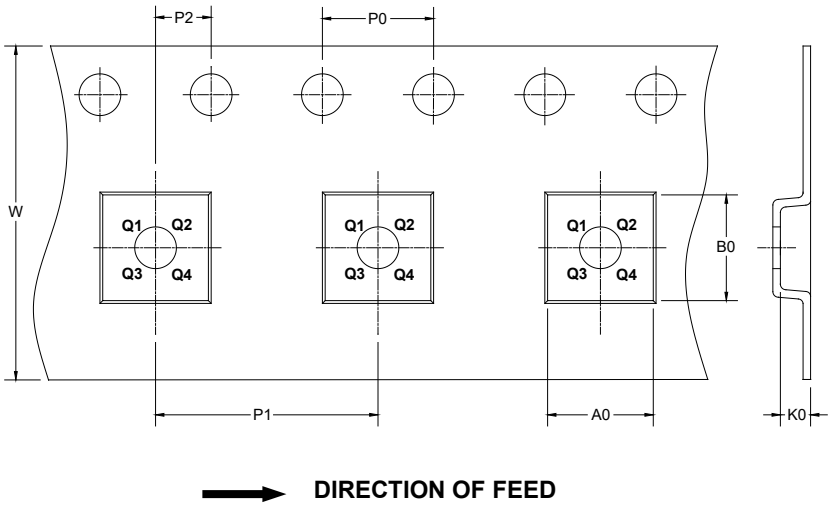
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



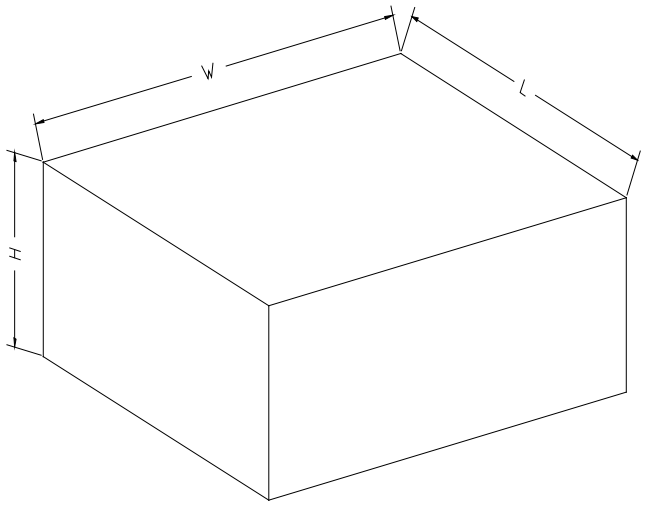
NOTE: The picture is only for reference. Please make the object as the standard.

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
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
XTDFN-1×1-6L	7"	9.5	1.15	1.17	0.56	4.0	4.0	2.0	8.0	Q2
UTDFN-1.45×1-6AL	7"	9.5	1.15	1.60	0.75	4.0	4.0	2.0	8.0	Q1

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