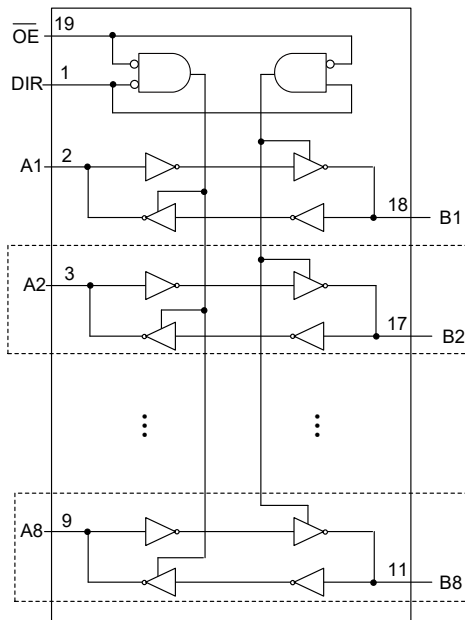## GENERAL DESCRIPTION

The 74LVT245B device is a high-performance 8-bit transceiver for 3.3V V_{CC} operation, but with the capability to provide an interface to 5V system environment. The non-inverting 3-state bus compatible outputs are available in both sending and receiving directions.

The device can be used as an 8-bit transceiver. The direction control (DIR) input determines the direction of the data flow. DIR (active-high) enables data from An ports to Bn ports. DIR (active-low) enables data from Bn ports to An ports. The output enable ($\overline{OE}$) input, when high, disables both An and Bn ports by placing them in a high-impedance state.

The 74LVT245B is available in Green TSSOP-20, SOIC-20 and SSOP-20 packages. It operates over an operating temperature range of -40℃ to +125℃.

LOGIC DIAGRAM

FEATURES

- **Wide Operating Voltage Range: 2.7V to 3.6V**
- **Input and Output Interface Capability to 5V System Environment**
- **+64mA/-32mA Output Current**
- **3-State Outputs Drive Bus Lines Directly**
- **Power-up and I_{OFF} 3-State**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green TSSOP-20, SOIC-20 and SSOP-20 Packages**

FUNCTION TABLE

CONTROL INPUT		INPUT/OUTPUT	
$\overline{OE}$	DIR	An	Bn
L	L	An = Bn	Inputs
L	H	Inputs	Bn = An
H	X	Z	Z

H = High Voltage Level
L = Low Voltage Level
Z = High-Impedance State
X = Don't Care

APPLICATIONS

Industrial Equipment
Medical Devices
Telecom Equipment
Computing Devices

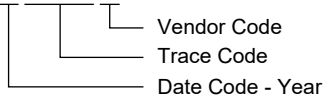## PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVT245B	TSSOP-20	-40℃ to +125℃	74LVT245BXTS20G/TR	179XTS20 XXXXX	Tape and Reel, 4000
	SOIC-20	-40℃ to +125℃	74LVT245BXS20G/TR	74LVT245BXS20 XXXXX	Tape and Reel, 1500
	SSOP-20	-40℃ to +125℃	74LVT245BXSS20G/TR	74LVT245B XSS20 XXXXX	Tape and Reel, 2000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

X X X X X
- Vendor Code
- Trace Code
- Date Code - Year

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, V_{CC}.. -0.5V to 4.6V
Input Voltage, V_I [2]... -0.5V to 7V
Output Voltage, V_O [2]
  Output in 3-State or High-State.......................... -0.5V to 7V
Input Clamping Current, I_{IK} (V_I < 0V)............................-50mA
Output Clamping Current, I_{OK} (V_O < 0V) ....-50mA
Output Current, I_O
  Output in High-State ....-64mA
  Output in Low-State 128mA
Supply Current, I_{CC} 128mA
Ground Current, I_{GND}...-256mA
Junction Temperature [3] ....+150℃
Storage Temperature Range .... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ....+260℃
ESD Susceptibility
HBM..8000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage, V_{CC}...2.7V to 3.6V
Input Voltage, V_I...0V to 5.5V
High-Level Output Current, I_{OH} ....-32mA
Low-Level Output Current, I_{OL}..64mA
Input Transition Rise or Fall Time, Δt/ΔV .... 10ns/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 input and output voltage ratings may be exceeded if the input and output clamp 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.
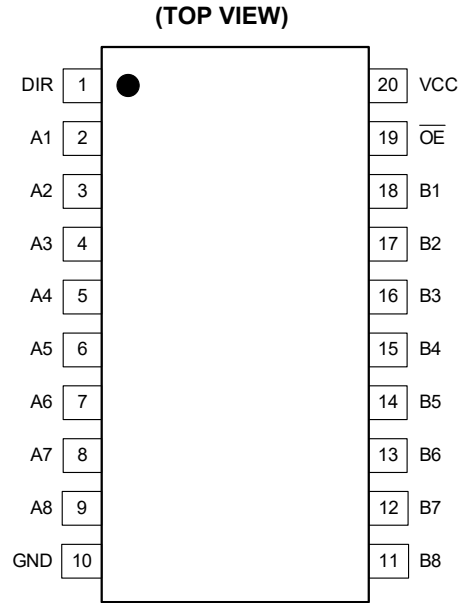
ESD SENSITIVITY CAUTION

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)

```
          ┌──────────────┐
  DIR ──│ 1  ●      20 │── VCC
   A1 ──│ 2         19 │── OE
   A2 ──│ 3         18 │── B1
   A3 ──│ 4         17 │── B2
   A4 ──│ 5         16 │── B3
   A5 ──│ 6         15 │── B4
   A6 ──│ 7         14 │── B5
   A7 ──│ 8         13 │── B6
   A8 ──│ 9         12 │── B7
  GND ──│ 10        11 │── B8
          └──────────────┘
```

TSSOP-20/SOIC-20/SSOP-20

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	DIR	Direction Control Pin.
2, 3, 4, 5, 6, 7, 8, 9	A1, A2, A3, A4, A5, A6, A7, A8	Data Inputs/Outputs.
10	GND	Ground Pin.
11, 12, 13, 14, 15, 16, 17, 18	B8, B7, B6, B5, B4, B3, B2, B1	Data Inputs/Outputs.
19	$\overline{OE}$	Output Enable Input (Active-Low).
20	VCC	Power Supply Pin.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at V_{CC} = 3.3V and T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Clamping Voltage	V_{IK}	V_{CC} = 2.7V, I_I = -18mA		Full	-1.2	-0.7		V
High-Level Input Voltage	V_{IH}			Full	2			V
Low-Level Input Voltage	V_{IL}			Full			0.8	V
High-Level Output Voltage	V_{OH}	V_{CC} = 2.7V to 3.6V	I_{OH} = -100µA	Full	V_{CC} - 0.2	V_{CC} - 0.01		V
		V_{CC} = 2.7V	I_{OH} = -8mA	Full	2.4	2.59		
		V_{CC} = 3V	I_{OH} = -32mA	Full	2.0	2.55		
Low-Level Output Voltage	V_{OL}	V_{CC} = 2.7V	I_{OL} = 100µA	Full		0.01	0.2	V
			I_{OL} = 24mA	Full		0.15	0.5	
		V_{CC} = 3V	I_{OL} = 16mA	Full		0.10	0.4	V
			I_{OL} = 32mA	Full		0.19	0.5	
			I_{OL} = 64mA	Full		0.35	0.55	
Input Leakage Current	I_I	Control Inputs	V_{CC} = 3.6V, V_I = V_{CC} or GND	Full		0.01	±1	µA
			V_{CC} = 0V or 3.6V, V_I = 5.5V	Full		0.01	10	
		A or B ports [1]	V_{CC} = 3.6V, V_I = 5.5V	Full		1.2	20	µA
			V_{CC} = 3.6V, V_I = V_{CC}	Full		0.01	1	
			V_{CC} = 3.6V, V_I = GND	Full	-5	-0.01		
Power-off Leakage Current	I_{OFF}	V_{CC} = 0V	V_I or V_O = 0V to 5.5V	Full		0.01	100	µA
Off-State Output Current	I_{OZH}	V_{CC} = 3.6V	V_O = 3V	Full		0.01	5	µA
	I_{OZL}	V_{CC} = 3.6V	V_O = 0.5V	Full	-5	-0.01		µA
Power-up/down Output Current	$I_{O\_PU/PD}$	V_{CC} ≤ 1.2V, V_O = 0.5V to V_{CC}, V_I = GND or V_{CC}, $\overline{OE}$ = don't care		+25℃		1	10	µA
Supply Current	I_{CC}	V_{CC} = 3.6V, I_O = 0A, V_I = V_{CC} or GND	Outputs high	Full		14	90	µA
			Outputs low	Full		14	90	
			Outputs disabled [2]	Full		14	90	
Additional Supply Current	ΔI_{CC}	V_{CC} = 3V to 3.6V, one input at V_{CC} - 0.6V, other inputs at V_{CC} or GND		Full		14	200	µA
Input Capacitance	C_I	V_I = 3V or 0V		+25℃		6		pF
Input/Output Capacitance	$C_{I/O}$	V_O = 3V or 0V		+25℃		9		pF

NOTES:

1. Other pins must be tied to V_{CC} or GND and should not be floating.

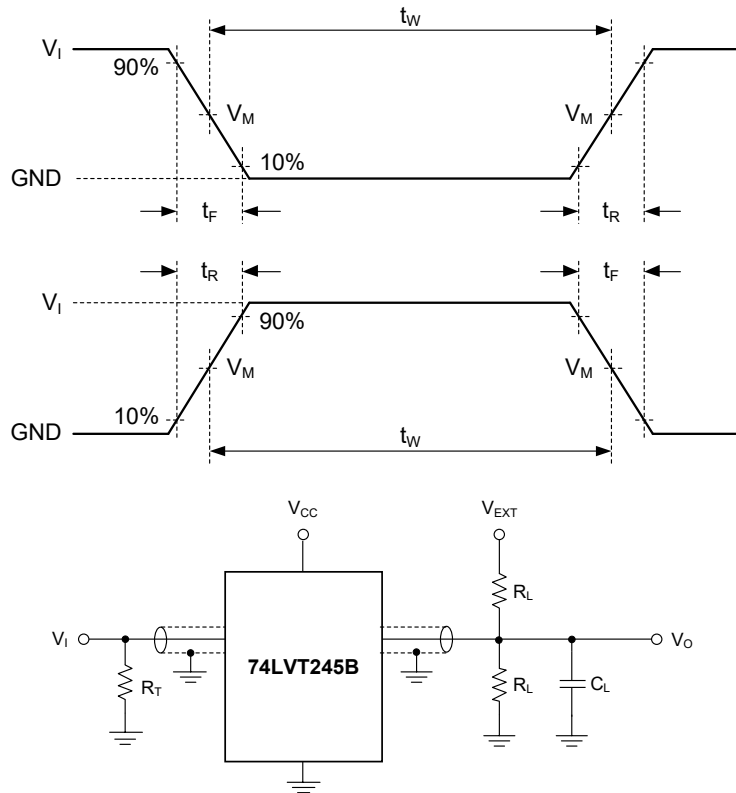2. I_{CC} is measured with outputs pulled to V_{CC} or GND.

DYNAMIC CHARACTERISTICS

(Full = -40℃ to +125℃, C_L = 50pF, all typical values are measured at V_{CC} = 3.3V and T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN [1]	TYP	MAX [1]	UNITS
Low to High Propagation Delay	t_{PLH}	An to Bn or Bn to An, see Figure 2	V_{CC} = 2.7V	Full		3.6	8.5	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	3.4	7.2	
High to Low Propagation Delay	t_{PHL}	An to Bn or Bn to An, see Figure 2	V_{CC} = 2.7V	Full		3.2	6.2	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	3.0	5.6	
Off- to High-State Propagation Delay	t_{PZH}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.7V	Full		4.2	9.4	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	4.0	7.8	
Off- to Low-State Propagation Delay	t_{PZL}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.7V	Full		4.0	6.5	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	3.8	6.2	
High- to Off-State Propagation Delay	t_{PHZ}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.7V	Full		4.4	7.6	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	4.0	7.0	
Low- to Off-State Propagation Delay	t_{PLZ}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.7V	Full		4.2	6.8	ns
			V_{CC} = 3.0V to 3.6V	Full	0.5	4.0	6.5	

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).

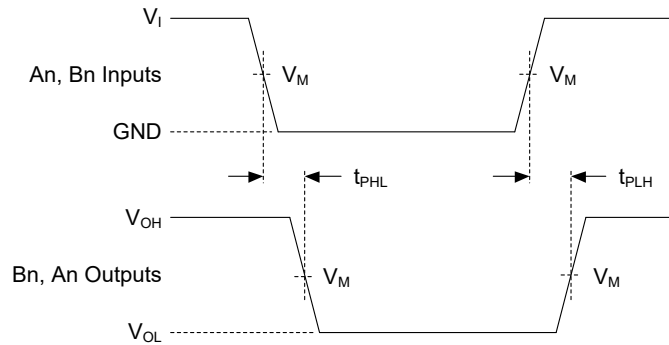R_T: Termination resistance (equals to output impedance Z_O of the pulse generator).

V_{EXT}: External voltage 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	t_{PHZ}, t_{PZH}	t_{PLZ}, t_{PZL}	t_{PLH}, t_{PHL}
2.7V to 3.6V	2.7V	≤ 2.5ns	50pF	500Ω	GND	6V	Open

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. Inputs (An, Bn) to Outputs (Bn, An) Propagation Delays

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 3. Enable and Disable Times

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUTS		OUTPUTS		
V_{CC}	V_I	V_M [(1)]	V_M	V_X	V_Y
2.7V to 3.6V	2.7V	1.5V	1.5V	V_{OL} + 0.3V	V_{OH} - 0.3V

NOTE: 1. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 2.5ns.

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.
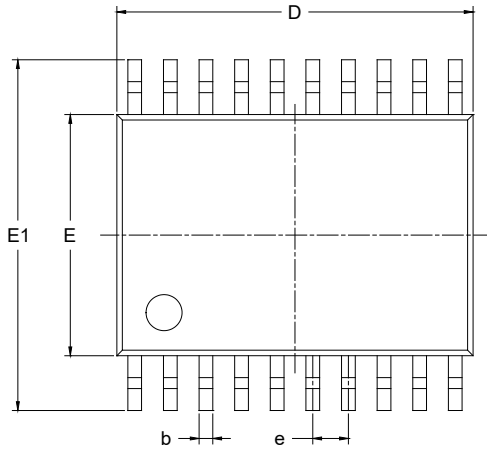
Changes from Original (AUGUST 2024) to REV.A   **Page**
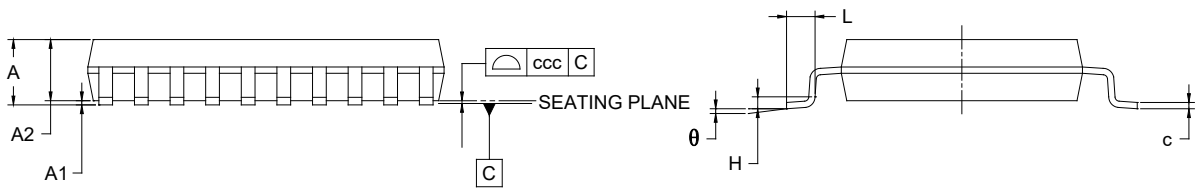
Changed from product preview to production data..All

PACKAGE OUTLINE DIMENSIONS
TSSOP-20

5.94

1.78

0.42   0.65

RECOMMENDED LAND PATTERN (Unit: mm)

SEATING PLANE

Symbol	Dimensions In Millimeters		
	MIN	**NOM**	**MAX**
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	6.400	-	6.600
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-153.

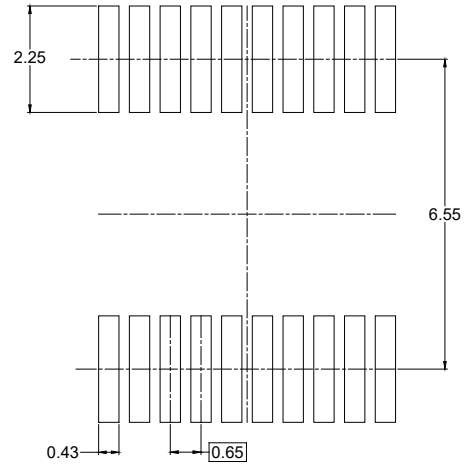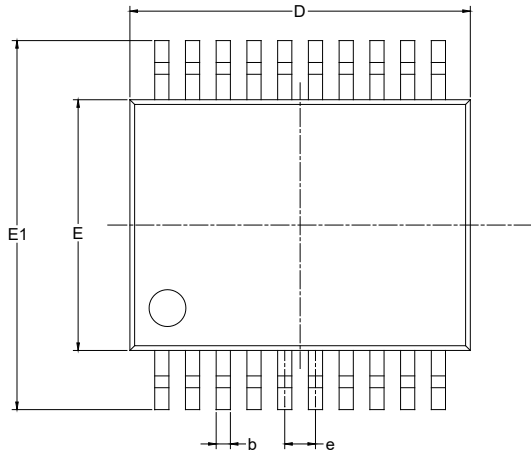# PACKAGE OUTLINE DIMENSIONS
SOIC-20

RECOMMENDED LAND PATTERN (Unit: mm)

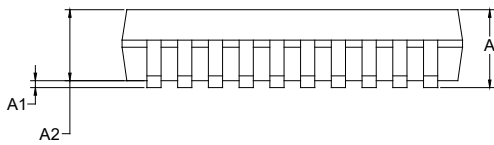| Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A	2.350	2.650	0.093	0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
c	0.204	0.330	0.008	0.013
D	12.520	13.000	0.493	0.512
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
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

SSOP-20

RECOMMENDED LAND PATTERN (Unit: mm)

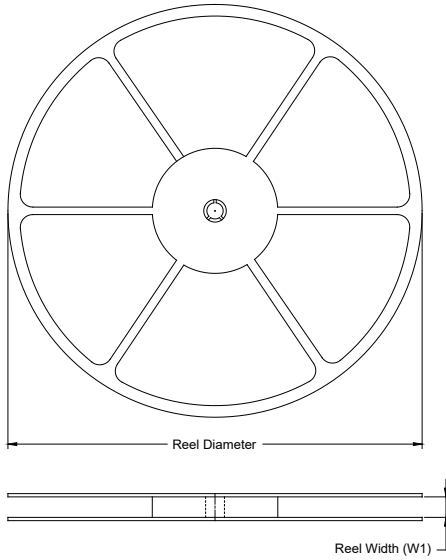| Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A		1.730		0.068
A1	0.050	0.230	0.002	0.009
A2	1.400	1.600	0.055	0.063
b	0.220	0.380	0.009	0.015
c	0.090	0.250	0.004	0.010
D	7.000	7.400	0.276	0.291
E	5.100	5.500	0.201	0.217
E1	7.600	8.000	0.299	0.315
e	0.65 BSC		0.026 BSC	
L	0.550	0.950	0.022	0.037
θ	0°	8°	0°	8°

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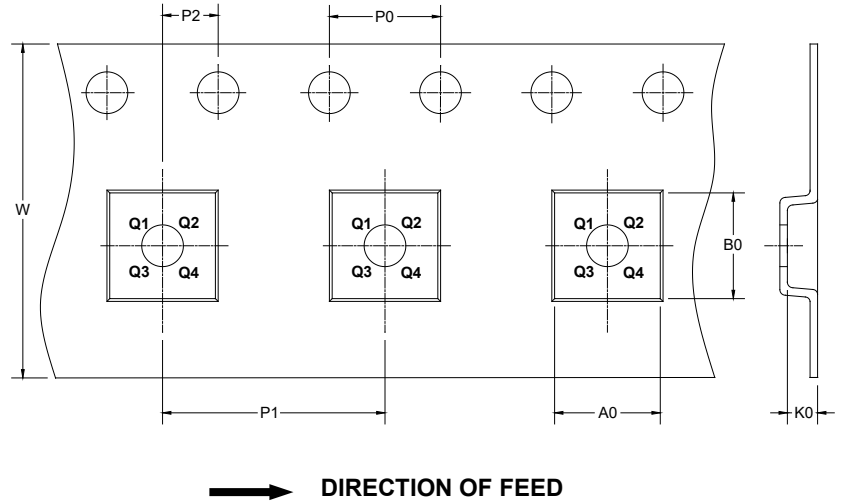2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS

DIRECTION OF FEED

NOTE: The picture is only for reference. Please make the object as the standard.
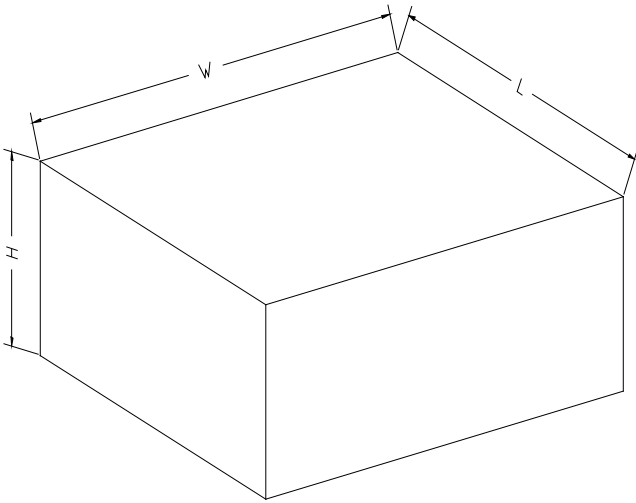
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP-20	13"	16.4	6.80	6.90	1.50	4.0	8.0	2.0	16.0	Q1
SOIC-20	13"	24.4	10.90	13.30	3.00	4.0	12.0	2.0	24.0	Q1
SSOP-20	13"	16.4	8.40	7.75	2.50	4.0	12.0	2.0	16.0	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
13″	386	280	370	5

DD0002