74AVC4T245Q
Automotive, 4-Bit Dual-Supply Translating Transceiver with Configurable Voltage Translation and 3-State Outputs

GENERAL DESCRIPTION

The 74AVC4T245Q is a 4-bit, dual-supply voltage level transceiver with 3-state outputs and bidirectional level translation. The device can be used as two 2-bit transceivers or one 4-bit transceiver. The nAn and nBn are four data input-output ports. nDIR are the direction control inputs and $n\overline{OE}$ are the output enable inputs. V_{CCA} and V_{CCB} are the supply pins. The supply voltage of V_{CCA} and V_{CCB} can range from 0.8V to 3.6V, making the device suitable for bidirectional translating among any of the 0.8V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V voltage nodes. The nAn, nDIR and $n\overline{OE}$ signals are referenced to V_{CCA} and nBn signals are referenced to V_{CCB}.

When nDIR is set high, it allows transmission from nAn to nBn. When nDIR is set low, it allows transmission from nBn to nAn. $n\overline{OE}$ can be used to make the outputs disabled so that the buses are effectively isolated. In suspend mode, both nAn and nBn are in high-impedance state when either V_{CCA} or V_{CCB} input is at GND level.

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 outputs are disabled, and the current backflow can be prevented from passing through the device.

The device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The 74AVC4T245Q is available in Green TSSOP-16, TQFN-3.5×4-16L and TQFN-2.5×3.5-16L packages. It operates over an operating temperature range of -40℃ to +125℃.

FEATURES

- **AEC-Q100 Qualified for Automotive Applications Device Temperature Grade 1**
  T_A = -40℃ to +125℃
- **V_{CCA} Supply Voltage Range: 0.8V to 3.6V**
- **V_{CCB} Supply Voltage Range: 0.8V to 3.6V**
- **Inputs Accept Voltages Higher than the Supply Voltage and up to 3.6V**
- **+12mA/-12mA Output Current**
- **Data Rates:**
  - **380Mbps (≥ 1.8V to 3.3V Translation)**
  - **200Mbps (≥ 1.1V to 3.3V Translation)**
  - **200Mbps (≥ 1.1V to 2.5V Translation)**
  - **200Mbps (≥ 1.1V to 1.8V Translation)**
  - **150Mbps (≥ 1.1V to 1.5V Translation)**
  - **100Mbps (≥ 1.1V to 1.2V Translation)**
- **Outputs in High-Impedance State when V_{CCA} or V_{CCB} = 0V**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green TSSOP-16, TQFN-3.5×4-16L and TQFN-2.5×3.5-16L Packages**

APPLICATIONS

Automotive Applications
Personal Electronic Devices
Enterprise Infrastructures
Telecom Equipment

PACKAGE/ORDERING INFORMATION

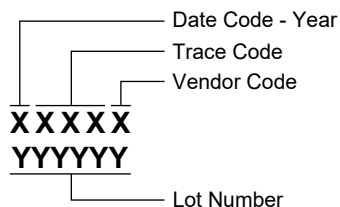| MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE TOP MARKING	PACKING OPTION
74AVC4T245Q	TSSOP-16	-40℃ to +125℃	74AVC4T245QTS16G/TR	MEATS16 XXXXX	Tape and Reel, 4000
	TQFN-3.5×4-16L	-40℃ to +125℃	74AVC4T245QTUU16G/TR	0OX XXXXX	Tape and Reel, 4000
	TQFN-2.5×3.5-16L	-40℃ to +125℃	74AVC4T245QTRG16G/TR	0OWTRG XXXXX YYYYYY	Tape and Reel, 8000

MARKING INFORMATION

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

TSSOP-16/TQFN-3.5×4-16L

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

TQFN-2.5×3.5-16L

— Date Code - Year
— Trace Code
— Vendor Code
X X X X X
YYYYYY
— Lot Number
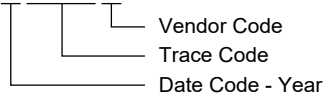
Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS [1]

Supply Voltage Range, V_{CCA}.............................. -0.5V to 4.6V

Supply Voltage Range, V_{CCB}.............................. -0.5V to 4.6V

Input Voltage Range, V_I [2] .... -0.5V to 4.6V

Output Voltage Range, V_O [2]

  Suspend or 3-State Mode .... -0.5V to 4.6V

  Active Mode

  A Ports ....-0.5V to MIN(4.6V, V_{CCA} + 0.5V)

  B Ports ....-0.5V to MIN(4.6V, V_{CCB} + 0.5V)

Input Clamp Current, I_{IK} (V_I < 0V) ....-50mA

Output Clamp Current, I_{OK} (V_O < 0V) ....-50mA

Continuous Output Current, I_O (V_O = 0V to V_{CC})..........±50mA

Continuous Current through $V_{CCA/B}$ or GND..............±100mA

Junction Temperature [3] ....+150℃

Storage Temperature Range ....-65℃ to +150℃

Lead Temperature (Soldering, 10s) ....+260℃

ESD Susceptibility

HBM...6000V

CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CCA}................................0.8V to 3.6V

Supply Voltage Range, V_{CCB}................................0.8V to 3.6V

Input Voltage Range, V_I..0V to 3.6V

Output Voltage Range, V_O

  Suspend or 3-State Mode ....0V to 3.6V

  Active Mode

  A Ports ....0V to V_{CCA}

  B Ports ....0V to V_{CCB}

High-State or Low-State Output Current, I_O ....±12mA

Input Transition Rise or Fall Rate, Δt/ΔV

  V_{CCI} = 0.8V to 3.6V...5ns/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.

LOGIC DIAGRAM
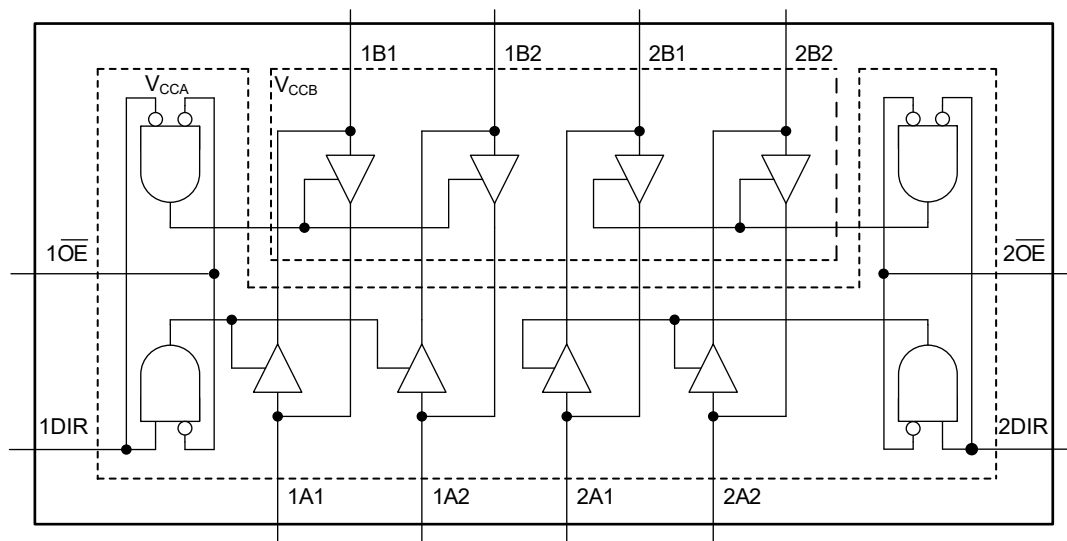
FUNCTION TABLE

SUPPLY VOLTAGE	CONTROL INPUT		INPUT/OUTPUT	
V_{CCA}, V_{CCB} [1]	n$\overline{OE}$	nDIR	nAn	nBn
0.8V to 3.6V	L	L	nAn = nBn	Inputs
0.8V to 3.6V	L	H	Inputs	nBn = nAn
0.8V to 3.6V	H	X	Z	Z
GND [2]	X	X	Z	Z

H = High Voltage Level
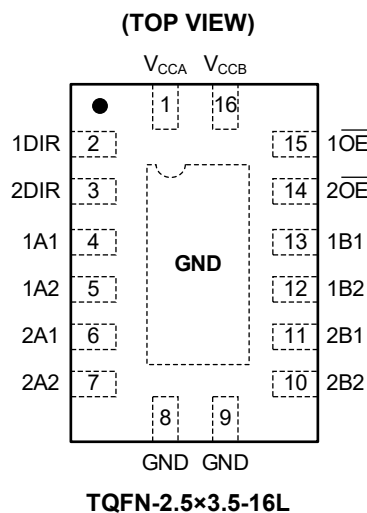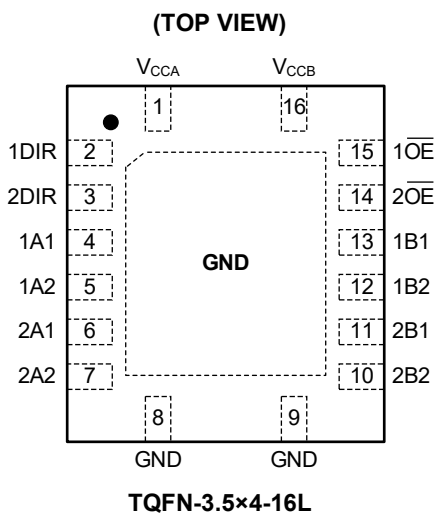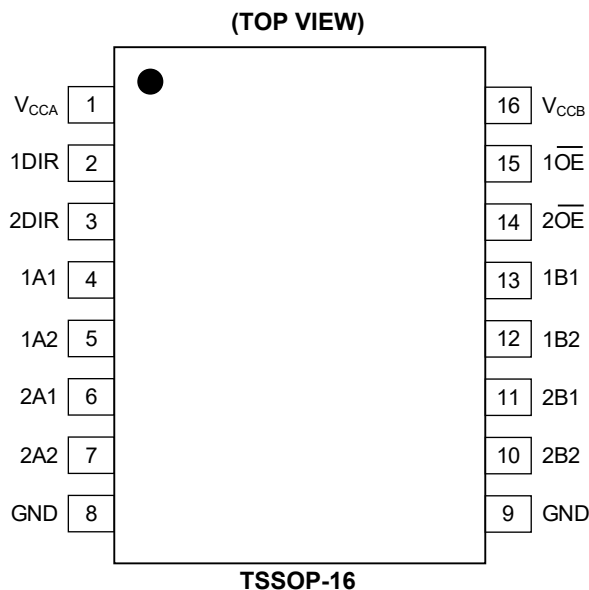
L = Low Voltage Level

Z = High-Impedance State

X = Don't Care

NOTES:

1. The nAn, nDIR and n$\overline{OE}$ signals are referenced to V_{CCA}. The nBn signals are referenced to V_{CCB}.

2. If either V_{CCA} or V_{CCB} is at GND level, the device gets into suspend mode.

PIN CONFIGURATIONS

(TOP VIEW)

V_{CCA}	1			16	V_{CCB}
1DIR	2			15	1$\overline{OE}$
2DIR	3			14	2$\overline{OE}$
1A1	4			13	1B1
1A2	5			12	1B2
2A1	6			11	2B1
2A2	7			10	2B2
GND	8			9	GND

TSSOP-16

(TOP VIEW)

TQFN-3.5×4-16L

(TOP VIEW)

TQFN-2.5×3.5-16L

| PIN		NAME	FUNCTION
TSSOP-16	**TQFN-3.5×4-16L/ TQFN-2.5×3.5-16L**		
1	1	V_{CCA}	Supply Voltage V_{CCA}. The nAn, nDIR and n$\overline{OE}$ signals are referenced to V_{CCA}.
2, 3	2, 3	1DIR, 2DIR	Direction Control Inputs.
4, 5	4, 5	1A1, 1A2	Data Inputs/Outputs.
6, 7	6, 7	2A1, 2A2	Data Inputs/Outputs.
8, 9	8, 9	GND	Ground.
11, 10	11, 10	2B1, 2B2	Data Inputs/Outputs.
13, 12	13, 12	1B1, 1B2	Data Inputs/Outputs.
15, 14	15, 14	1$\overline{OE}$, 2$\overline{OE}$	Output Enable Inputs (Active-Low).
16	16	V_{CCB}	Supply Voltage V_{CCB}. The nBn signals are referenced to V_{CCB}.
—	Exposed Pad	GND	Connect it to GND internally. This pad is not an electrical connection point.

PACKAGE OUTLINE DIMENSIONS

TSSOP-16

RECOMMENDED LAND PATTERN (Unit: mm)

SEATING PLANE
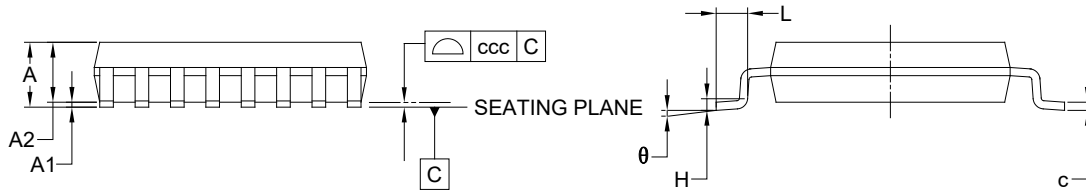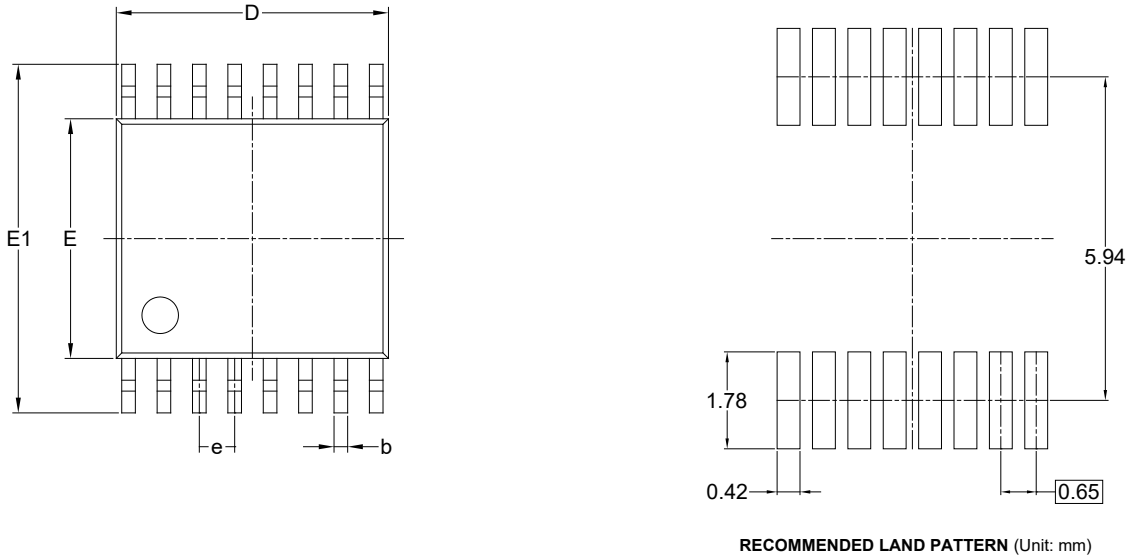
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

## PACKAGE OUTLINE DIMENSIONS

TQFN-3.5×4-16L

TOP VIEW

BOTTOM VIEW

SIDE VIEW

DETAIL A
ALTERNATE TERMINAL CONSTRUCTION
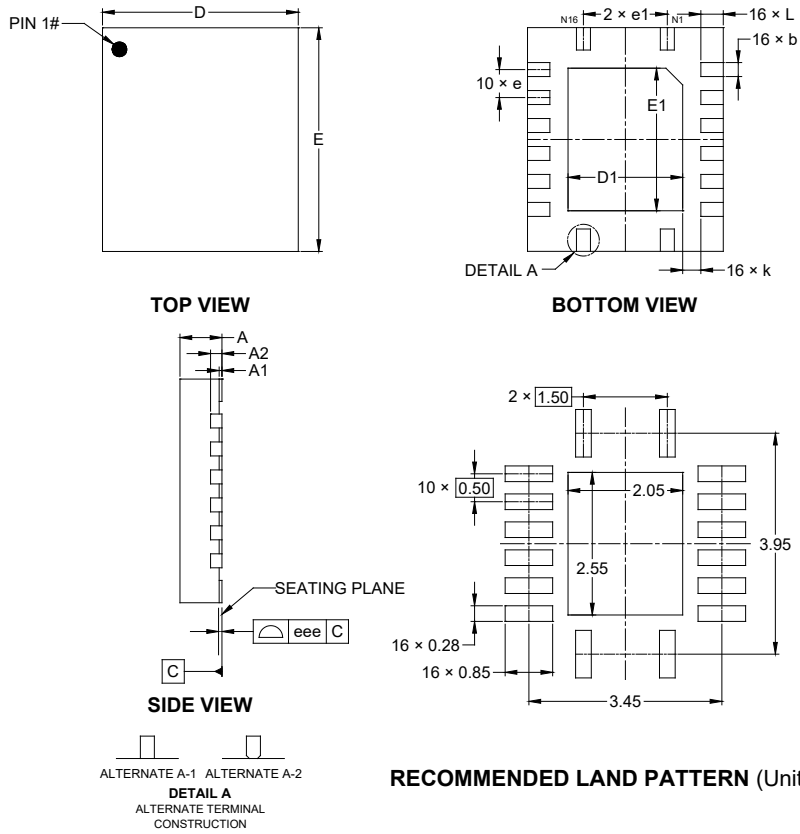
RECOMMENDED LAND PATTERN (Unit: mm)

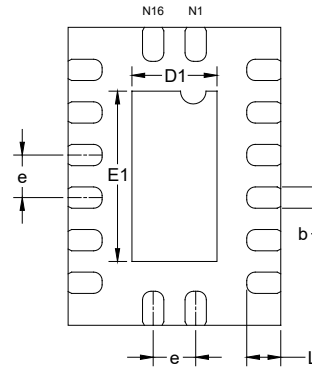| Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.200	-	0.300
D	3.400	-	3.600
E	3.900	-	4.100
D1	1.950	-	2.150
E1	2.450	-	2.650
e	0.500 BSC		
e1	1.500 BSC		
k	0.325 REF		
L	0.300	-	0.500
eee	0.080		

NOTE: This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

TQFN-2.5×3.5-16L
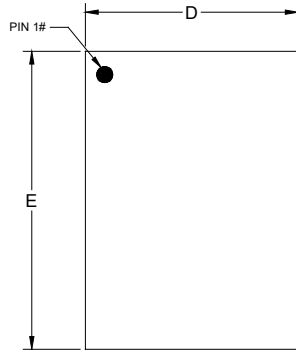
TOP VIEW

BOTTOM VIEW

SIDE VIEW
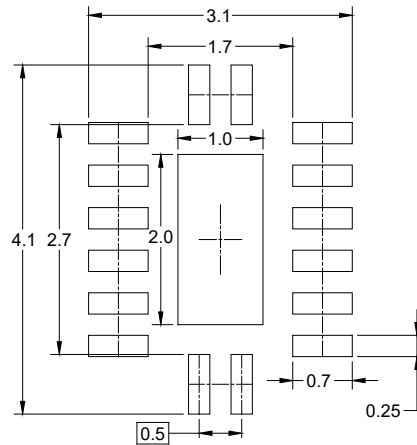
RECOMMENDED LAND PATTERN (Unit: mm)

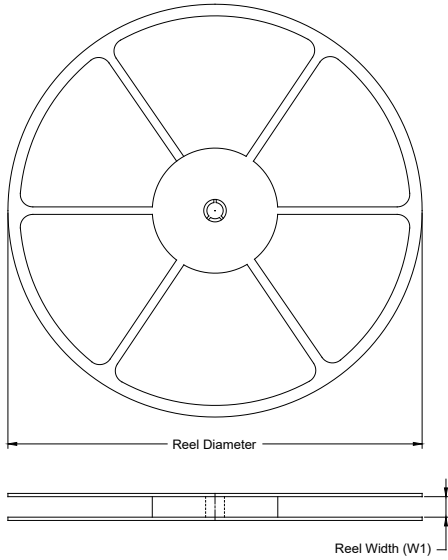| Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.203 REF		
b	0.20	0.25	0.30
D	2.40	2.50	2.60
D1	0.85	1.00	1.15
E	3.40	3.50	3.60
E1	1.85	2.00	2.15
e	0.45	0.50	0.55
L	0.30	0.40	0.50

NOTE: This drawing is subject to change without notice.

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TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS
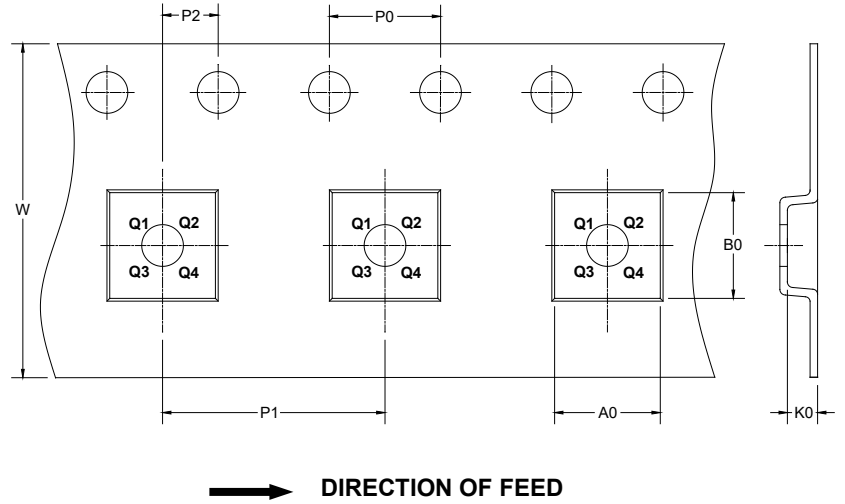
Reel Diameter

Reel Width (W1)

DIRECTION OF FEED

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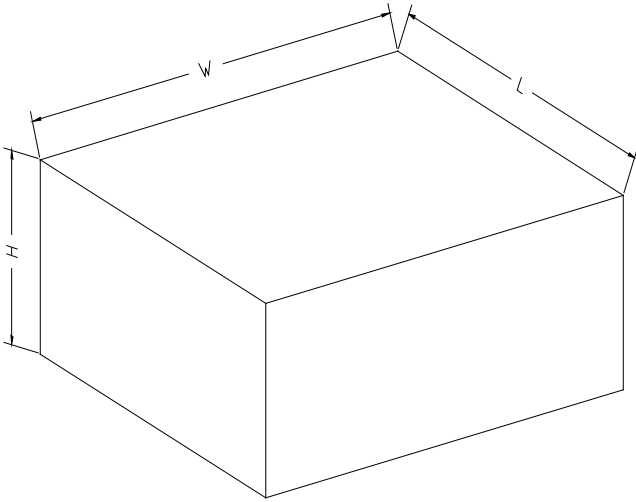
KEY PARAMETER LIST OF TAPE AND REEL

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-16	13″	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	Q1
TQFN-3.5×4-16L	13"	12.4	3.80	4.30	1.05	4.0	8.0	2.0	12.0	Q1
TQFN-2.5×3.5-16L	13"	12.4	2.80	3.80	1.13	4.0	4.0	2.0	12.0	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

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