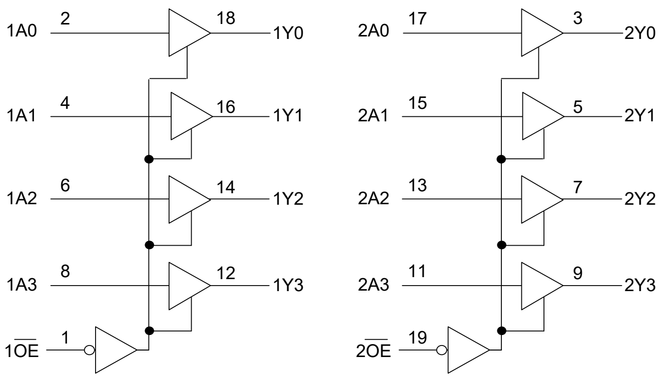
74LVCN244
Octal Buffer/Line Driver with 3-State Outputs

GENERAL DESCRIPTION

74LVCN244 is octal buffer/line driver with non- inverting 3-state bus outputs and it is designed for 1.2V to 3.6V V_{CC} operation. The device is organized as two 4-bit line drivers with separate output enable inputs (1$\overline{OE}$ and 2$\overline{OE}$). When n$\overline{OE}$ is low, the device passes data from the nAn inputs to the nYn outputs. When n$\overline{OE}$ is high, the outputs are in the high-impedance state. Schmitt-trigger action at all inputs makes the circuit highly tolerant for slow input rise and fall times.

Inputs can be driven from either 3.3V or 5V devices. In 3-state operation, outputs can handle 5V. These features allow the device as translators in a mixed 3.3V and 5V environment.

LOGIC SYMBOL



FUNCTION TABLE

CONTROL INPUT	INPUT	OUTPUT
n$\overline{OE}$	nAn	nYn
L	L	L
L	H	H
H	*X*	Z

H = High Voltage Level

L = Low Voltage Level

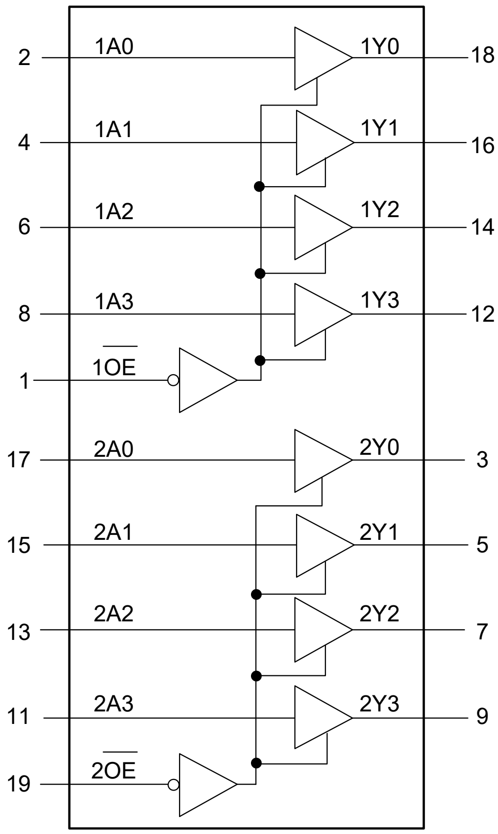
Z = High-Impedance State

X = Don't Care

FEATURES

- **5V Tolerant Inputs/Outputs for Interfacing with 5V Logic**
- **Wide Supply Voltage Range: 1.2V to 3.6V**
- **CMOS Low-Power Consumption**
- **Direct Interface with TTL Levels**
- **Inputs Accept Voltages up to 5.5V**
- **High-Impedance When V_{CC} = 0V**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SOIC-20 Package**

LOGIC DIAGRAM



PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVCN244	SOIC-20	-40℃ to +125℃	74LVCN244XS20G/TR	74LVCN244XS20 XXXXX	Tape and Reel, 1500

MARKING INFORMATION

XXXXX = Date Code, Trace Code and Vendor Code.

XXXXX
- X (5th) — Vendor Code
- XXX (2nd–4th) — Trace Code
- X (1st) — 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 6.5V
Input Voltage, V_I (2) .... -0.5V to 6.5V
Output Voltage, V_O (2)
  Output in High-State or Low-State .... -0.5V to (V_{CC} + 0.5V)
  Output in 3-State .... -0.5V to 6.5V
Input Clamping Current, I_{IK} (V_I < 0V) .... -50mA
Output Clamping Current, I_{OK} (V_O > V_{CC} or V_O < 0V)
.... ±50mA
Output Current, I_O
  Output in High-State or Low-State .... ±50mA
Supply Current, I_{CC} 100mA
Ground Current, I_{GND} .... -100mA
Junction Temperature (3) .... +150℃
Storage Temperature Range .... -65℃ to +150℃
Lead Temperature (Soldering, 10s) .... +260℃
ESD Susceptibility
HBM 4000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Function Supply Voltage, V_{CC} .... 1.2V to 3.6V
Operating Supply Voltage, V_{CC} .... 1.65V to 3.6V
Input Voltage, V_I .... 0V to 5.5V
High-Level Output Current, I_{OH} .... -24mA
Low-Level Output Current, I_{OL} 24mA
Input Transition Rise and Fall Rate, Δt/ΔV
  V_{CC} = 1.2V to 2.7V .... 20ns/V (MAX)
  V_{CC} = 2.7V to 3.6V .... 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 negative 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.

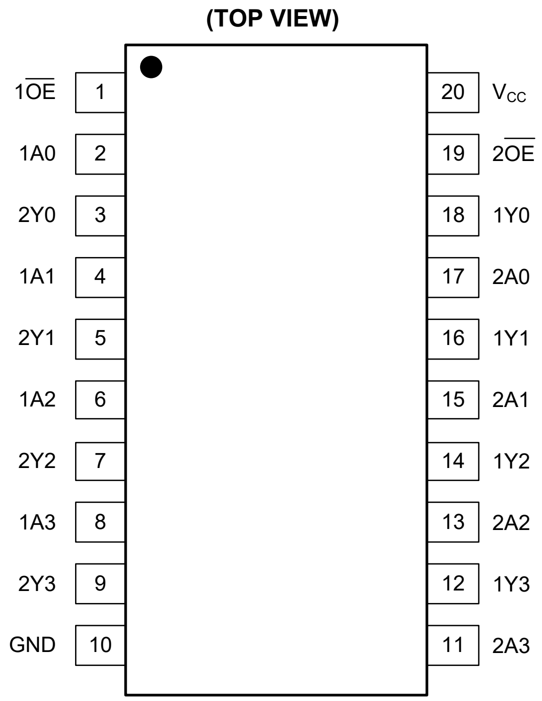
ESD SENSITIVITY CAUTION

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 notice.

PIN CONFIGURATION



SOIC-20

PIN DESCRIPTION

NAME	PIN	FUNCTION
1OE, 2OE	1, 19	Output Enable Inputs (Active Low).
1A0, 1A1, 1A2, 1A3	2, 4, 6, 8	Data Inputs.
2Y0, 2Y1, 2Y2, 2Y3	3, 5, 7, 9	Data Outputs.
GND	10	Ground.
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	Data Inputs.
1Y0, 1Y1, 1Y2, 1Y3	18, 16, 14, 12	Data Outputs.
V_{CC}	20	Supply Voltage.

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
High-Level Input Voltage	V_{IH}	V_{CC} = 1.2V		Full	1.08			V
		V_{CC} = 1.65V to 1.95V		Full	0.65 × V_{CC}			
		V_{CC} = 2.3V to 2.7V		Full	1.7			
		V_{CC} = 2.7V to 3.6V		Full	2			
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.2V		Full			0.12	V
		V_{CC} = 1.65V to 1.95V		Full			0.35 × V_{CC}	
		V_{CC} = 2.3V to 2.7V		Full			0.7	
		V_{CC} = 2.7V to 3.6V		Full			0.8	
High-Level Output Voltage	V_{OH}	V_I = V_{IH}	I_O = -100μA, V_{CC} = 1.65V to 3.6V	Full	V_{CC} - 0.05			V
			I_O = -4mA, V_{CC} = 1.65V	Full	1.45	1.54		
			I_O = -8mA, V_{CC} = 2.3V	Full	2.05	2.18		
			I_O = -12mA, V_{CC} = 2.7V	Full	2.38	2.55		
			I_O = -18mA, V_{CC} = 3.0V	Full	2.55	2.8		
			I_O = -24mA, V_{CC} = 3.0V	Full	2.4	2.73		
Low-Level Output Voltage	V_{OL}	V_I = V_{IL}	I_O = 100μA, V_{CC} = 1.65V to 3.6V	Full			0.05	V
			I_O = 4mA, V_{CC} = 1.65V	Full		0.07	0.18	
			I_O = 8mA, V_{CC} = 2.3V	Full		0.11	0.28	
			I_O = 12mA, V_{CC} = 2.7V	Full		0.16	0.35	
			I_O = 24mA, V_{CC} = 3.0V	Full		0.3	0.55	
Input Leakage Current	I_I	V_I = 5.5V or GND, V_{CC} = 3.6V		Full		±0.05	±2	μA
Off-State Output Current	I_{OZ}	V_I = V_{IH} or V_{IL}, V_O = 5.5V or GND, V_{CC} = 3.6V		Full		±0.01	±2	μA
Power-Off Leakage Current	I_{OFF}	V_I or V_O = 5.5V, V_{CC} = 0.0V		Full		0.02	5	μA
Supply Current	I_{CC}	V_I = V_{CC} or GND, I_O = 0A, V_{CC} = 3.6V		Full		0.05	10	μA
Additional Supply Current	ΔI_{CC}	Per input pin, V_I = V_{CC} - 0.6V, I_O = 0A, V_{CC} = 2.7V to 3.6V		Full		0.1	80	μA
Input Capacitance	C_I			Full		5		pF

DYNAMIC CHARACTERISTICS

(For test circuit see Figure 1. All typical values are measured at V_{CC} = 3.3V and T_A = +25℃, unless stated otherwise.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Propagation Delay [(1)]	t_{PD}	nAn to nYn, see Figure 2	V_{CC} = 1.2V	+25℃		22		ns
			V_{CC} = 1.65V to 1.95V	+25℃		5.5		
			V_{CC} = 2.3V to 2.7V	+25℃		3.5		
			V_{CC} = 2.7V	+25℃		3.5		
			V_{CC} = 3.0V to 3.6V	+25℃		3.5		
Enable Time [(1)]	t_{EN}	nOE to nYn, see Figure 3	V_{CC} = 1.2V	+25℃		19		ns
			V_{CC} = 1.65V to 1.95V	+25℃		7.5		
			V_{CC} = 2.3V to 2.7V	+25℃		4.5		
			V_{CC} = 2.7V	+25℃		4.5		
			V_{CC} = 3.0V to 3.6V	+25℃		4		
Disable Time [(1)]	t_{DIS}	nOE to nYn, see Figure 3	V_{CC} = 1.2V	+25℃		12		ns
			V_{CC} = 1.65V to 1.95V	+25℃		5		
			V_{CC} = 2.3V to 2.7V	+25℃		4.5		
			V_{CC} = 2.7V	+25℃		4.5		
			V_{CC} = 3.0V to 3.6V	+25℃		4		
Power Dissipation Capacitance [(2)]	C_{PD}	Per input, V_I = GND to V_{CC}	V_{CC} = 1.65V to 1.95V	+25℃		12		pF
			V_{CC} = 2.3V to 2.7V	+25℃		13		
			V_{CC} = 3.0V to 3.6V	+25℃		14		

NOTES:

1. t_{PD} is the same as t_{PLH} and t_{PHL}. t_{EN} is the same as t_{PZL} and t_{PZH}. t_{DIS} is the same as t_{PLZ} and t_{PHZ}.
2. 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.

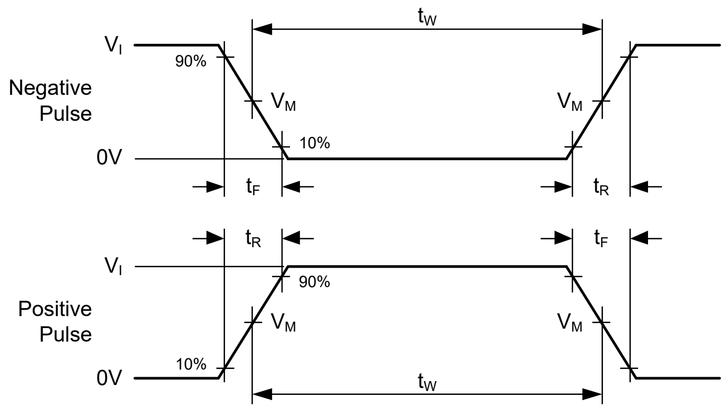
C_L = Output load capacitance in pF.

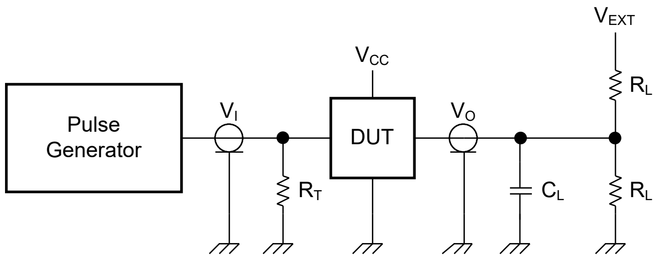
V_{CC} = Supply voltage in Volts.

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 including jig and probe capacitance.

R_T = Termination resistance should be equal to output impedance Z_O of the pulse generator.

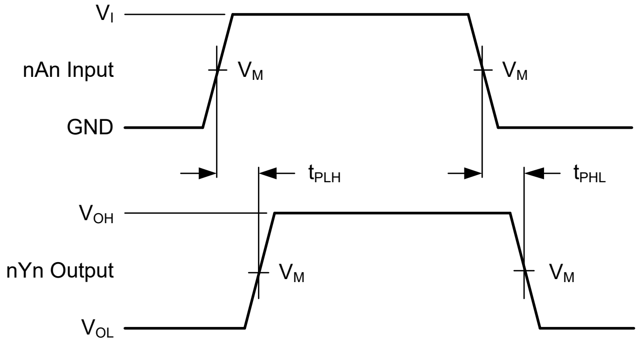
V_{EXT} = External voltage for measuring switching times.

Figure 1. Test Circuit for Measuring Switching Times

Table 1. Test Conditions

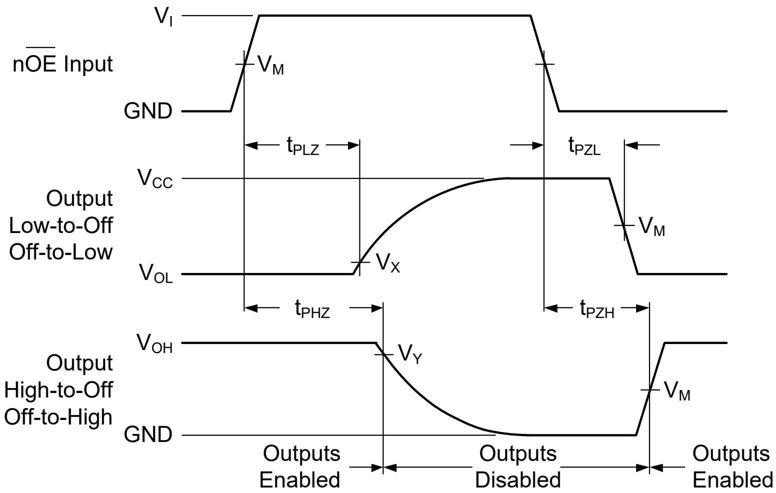
SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CC}	V_I	t_R, t_F	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
1.2V	V_{CC}	≤ 2ns	30pF	1kΩ	Open	2 × V_{CC}	GND
1.65V to 1.95V	V_{CC}	≤ 2ns	30pF	1kΩ	Open	2 × V_{CC}	GND
2.3V to 2.7V	V_{CC}	≤ 2ns	30pF	500Ω	Open	2 × V_{CC}	GND
2.7V	2.7V	≤ 2.5ns	50pF	500Ω	Open	2 × V_{CC}	GND
3.0V to 3.6V	2.7V	≤ 2.5ns	50pF	500Ω	Open	2 × V_{CC}	GND

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 (nAn) to Output (nYn) 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	INPUT		OUTPUT		
V_{CC}	V_I	V_M	V_M	V_X	V_Y
1.2V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15V	V_{OH} - 0.15V
1.65V to 1.95V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15V	V_{OH} - 0.15V
2.3V to 2.7V	V_{CC}	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15V	V_{OH} - 0.15V
2.7V	2.7V	1.5V	1.5V	V_{OL} + 0.3V	V_{OH} - 0.3V
3.0V to 3.6V	2.7V	1.5V	1.5V	V_{OL} + 0.3V	V_{OH} - 0.3V

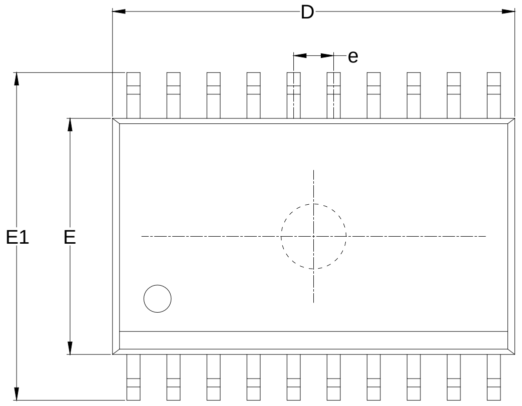
REVISION HISTORY

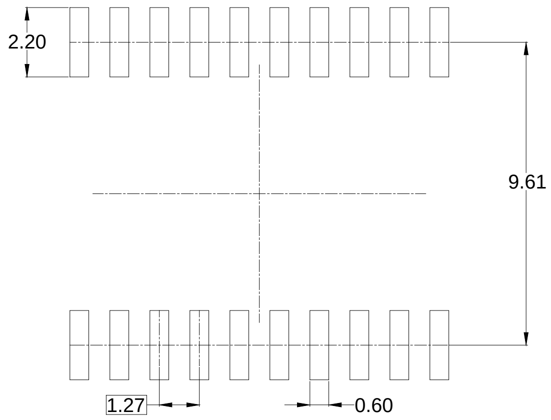
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (MARCH 2021) to REV.A	Page
Changed from product preview to production data	All

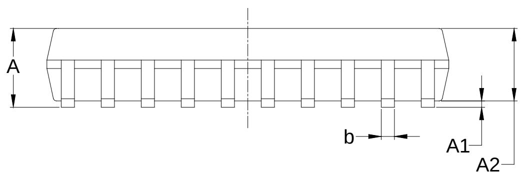
PACKAGE OUTLINE DIMENSIONS

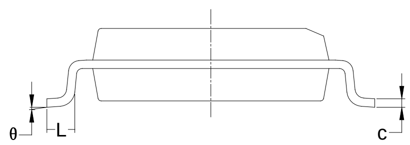
SOIC-20





RECOMMENDED LAND PATTERN (Unit: mm)

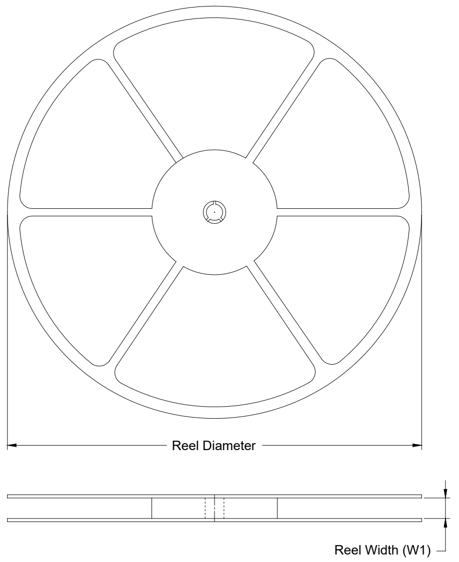




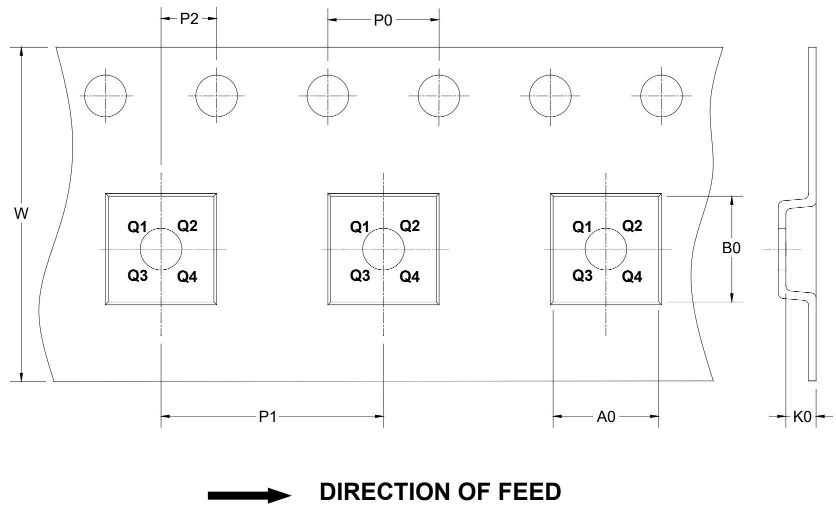
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	2.350	2.650	0.093	0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
c	0.204	0.330	0.008	0.013
D	12.520	13.000	0.493	0.512
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

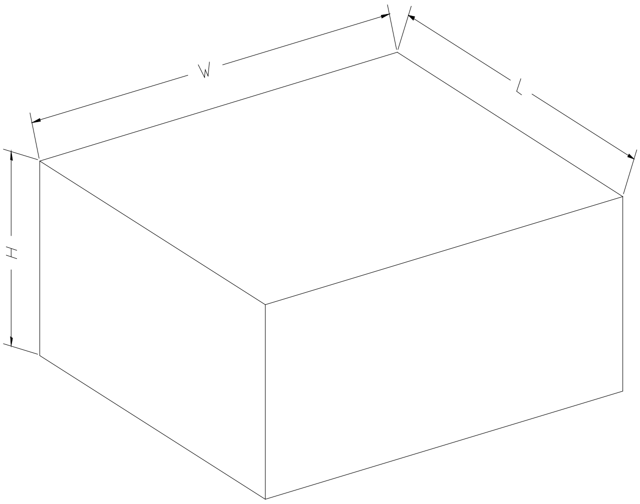
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-20	13″	24.4	10.90	13.30	3.00	4.0	12.0	2.0	24.0	Q1

DD0001

PACKAGE INFORMATION

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