74HCT245
Octal Bus Transceiver with 3-State Outputs

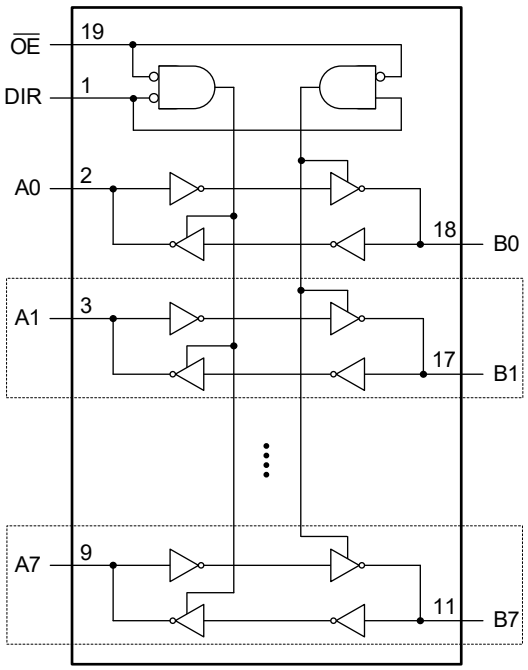
GENERAL DESCRIPTION

The 74HCT245 is an 8-bit bus transceiver with 3-state outputs. The supply voltage can accept any voltage from 2.0V to 5.5V. The An and Bn are 8-bit data input-output ports. DIR is the direction control input and $\overline{OE}$ is the output enable input.

When DIR is set high, it allows transmission from An to Bn. When DIR is set low, it allows transmission from Bn to An. $\overline{OE}$ can be used to make the outputs disabled so that the buses are effectively isolated. The clamp diodes of inputs allow the use of current limiting resistors to connect inputs to the voltage exceeding supply voltage.

The 74HCT245 is available in Green SOIC-20 and TSSOP-20 packages. It operates over a temperature range of -40℃ to +125℃.

LOGIC DIAGRAM



FEATURES

- **Wide Operating Voltage Range: 2.0V to 5.5V**
- **CMOS Low Power Consumption**
- **High Noise Immunity**
- **Octal Bus Interface with Bidirectional Translation**
- **3-State Non-Inverting Outputs**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SOIC-20 and TSSOP-20 Packages**

APPLICATIONS

Network Switch

Telecom Equipment

FUNCTION TABLE

CONTROL INPUTS		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

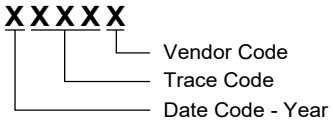
X = Don't Care

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74HCT245	SOIC-20	-40℃ to +125℃	74HCT245XS20G/TR	74HCT245XS20 XXXXX	Tape and Reel, 1500
	TSSOP-20	-40℃ to +125℃	74HCT245XTS20G/TR	74HCT245XTS20 XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor 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 7.0V
Input Voltage Range, V_I (1) .... -0.5V to MIN(7.0V, V_{CC} + 0.5V)
Output Voltage Range, V_O (1) -0.5V to MIN(7.0V, V_{CC} + 0.5V)
Input Clamp Current, I_{IK} (V_I < -0.5V or V_I > V_{CC} + 0.5V)
..... ±20mA
Output Clamp Current, I_{OK} (V_O < -0.5V or V_O > V_{CC} + 0.5V)
..... ±20mA
Continuous Output Current, I_O (-0.5V < V_O < V_{CC} + 0.5V)
..... ±35mA
Continuous Current through V_{CC} or GND..... ±70mA
Junction Temperature (2) .....+150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) .....+260℃
ESD Susceptibility (3) (4)
HBM..... ±6000V
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.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CC}..... 2.0V to 5.5V
Input Voltage Range, V_I..... 0V to V_{CC}
Output Voltage Range, V_O..... 0V to V_{CC}
Input Transition Rise or Fall Rate, Δt/ΔV
V_{CC} = 2.0V ..... 625ns/V (MAX)
V_{CC} = 4.5V ..... 139ns/V (MAX)
V_{CC} = 5.5V ..... 83ns/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

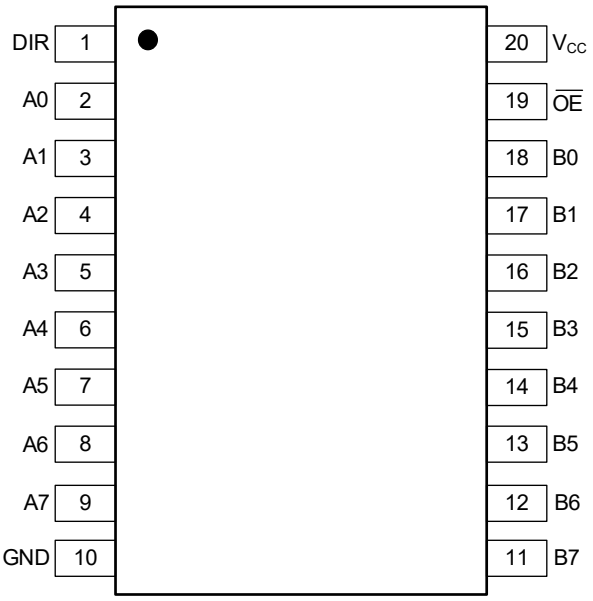
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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



SOIC-20/TSSOP-20

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	DIR	Direction Control Input.
2, 3, 4, 5, 6, 7, 8, 9	A0, A1, A2, A3, A4, A5, A6, A7	Data Inputs/Outputs.
10	GND	Ground.
18, 17, 16, 15, 14, 13, 12, 11	B0, B1, B2, B3, B4, B5, B6, B7	Data Inputs/Outputs.
19	$\overline{OE}$	Output Enable Input (Active-Low).
20	V_{CC}	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} = 2.0V	Full	1.30			V
		V_{CC} = 4.5V	Full	1.80			
		V_{CC} = 5.5V	Full	2.00			
Low-Level Input Voltage	V_{IL}	V_{CC} = 2.0V	Full			0.45	V
		V_{CC} = 4.5V	Full			0.80	
		V_{CC} = 5.5V	Full			1.00	
High-Level Output Voltage	V_{OH}	V_{CC} = 2.0V, I_{OH} = -20μA	Full	1.95	1.998		V
		V_{CC} = 4.5V, I_{OH} = -20μA	Full	4.45	4.498		
		V_{CC} = 5.5V, I_{OH} = -20μA	Full	5.45	5.498		
		V_{CC} = 4.5V, I_{OH} = -6mA	Full	4	4.29		
		V_{CC} = 5.5V, I_{OH} = -7.8mA	Full	5	5.26		
Low-Level Output Voltage	V_{OL}	V_{CC} = 2.0V, I_{OL} = 20μA	Full		0.002	0.05	V
		V_{CC} = 4.5V, I_{OL} = 20μA	Full		0.002	0.05	
		V_{CC} = 5.5V, I_{OL} = 20μA	Full		0.002	0.05	
		V_{CC} = 4.5V, I_{OL} = 6mA	Full		0.18	0.33	
		V_{CC} = 5.5V, I_{OL} = 7.8mA	Full		0.22	0.40	
Input Leakage Current	I_I	V_{CC} = 5.5V, V_I = V_{CC} or GND	Full		±0.1	±1	μA
Off-State Output Current	I_{OZ}	V_{CC} = 5.5V, V_I = V_{IH} or V_{IL}, V_O = V_{CC} or GND	Full		±0.1	±5	μA
Supply Current	I_{CC}	V_{CC} = 5.5V, V_I = GND or V_{CC}, I_O = 0A	Full		0.1	5	μA
Input Capacitance	C_I	DIR, $\overline{OE}$ inputs	+25℃		4		pF
Input/Output Capacitance	$C_{I/O}$	At input/output data pins, outputs disabled	+25℃		10		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}	An to Bn or Bn to An, see Figure 2	V_{CC} = 2.0V	Full	1	32	87	ns
			V_{CC} = 4.5V	Full	1	12	24.3	
			V_{CC} = 5.5V	Full	1	10	20.8	
Enable Time (2)	t_{EN}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.0V	Full	1	45	127	ns
			V_{CC} = 4.5V	Full	1	14	27.4	
			V_{CC} = 5.5V	Full	1	12	23.4	
Disable Time (2)	t_{DIS}	$\overline{OE}$ to An or Bn, see Figure 3	V_{CC} = 2.0V	Full	1	12	22.9	ns
			V_{CC} = 4.5V	Full	1	10	20	
			V_{CC} = 5.5V	Full	1	10	20	
Transition Time (2)	t_T	See Figure 2	V_{CC} = 2.0V	Full	1	20	51	ns
			V_{CC} = 4.5V	Full	0.5	6	16.5	
			V_{CC} = 5.5V	Full	0.5	5	13.7	
Power Dissipation Capacitance (3)	C_{PD}	Per input, V_{CC} = 3.3V, V_I = GND to V_{CC}		+25℃		10		pF

NOTES:

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

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

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.

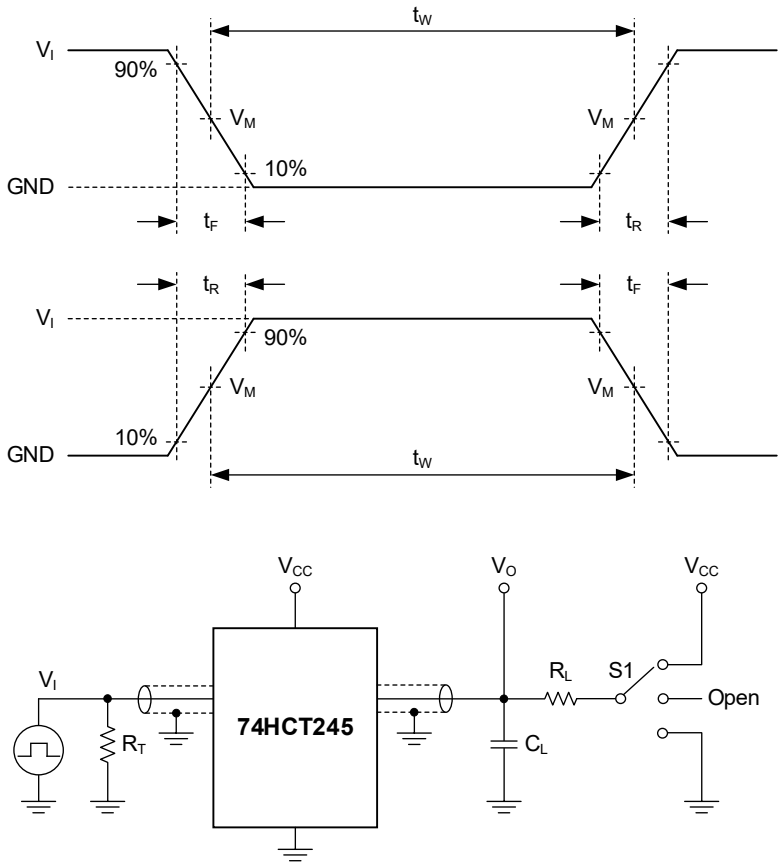
C_L = Output load capacitance in pF.

V_{CC} = Supply voltage in Volts.

N = Number of inputs switching.

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

S1: Test selection switch.

Figure 1. Test Circuit for Measuring Switching Times

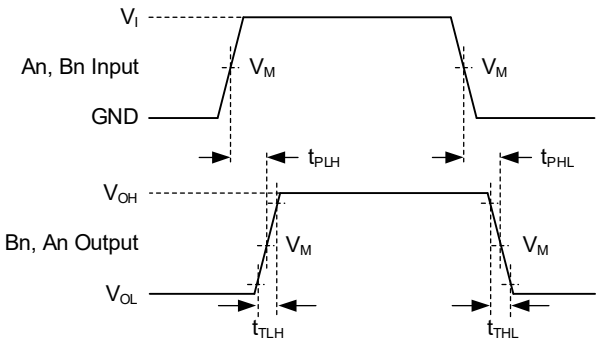
Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		S1 POSITION		
V_{CC}	V_I (1)	t_R, t_F	C_L	R_L	t_{PHL} t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
2.0V to 5.5V	3V	≤ 6ns	50pF	1kΩ	Open	GND	V_{CC}

NOTE:

1. When V_{CC} is greater than or equal to 3V, V_I is equal to 3V. When V_{CC} is less than 3V, V_I is equal to V_{CC}.

WAVEFORMS

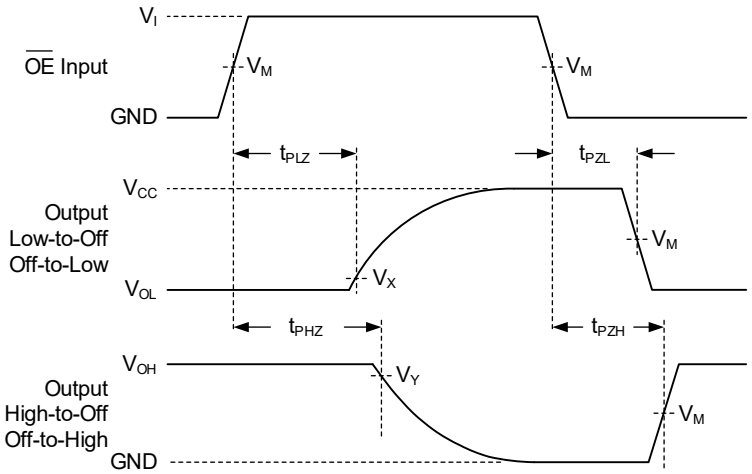


Test conditions are given in Table 1.

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 (An, Bn) to Output (Bn, An) Propagation Delay Times



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 (1)	V_M (2)	V_M	V_X	V_Y
2.0V to 5.5V	3V	1.3V	1.3V	0.1 × V_{CC}	0.9 × V_{CC}

NOTES:

1. When V_{CC} is greater than or equal to 3V, V_I is equal to 3V. When V_{CC} is less than 3V, V_I is equal to V_{CC}.

2. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 6ns.

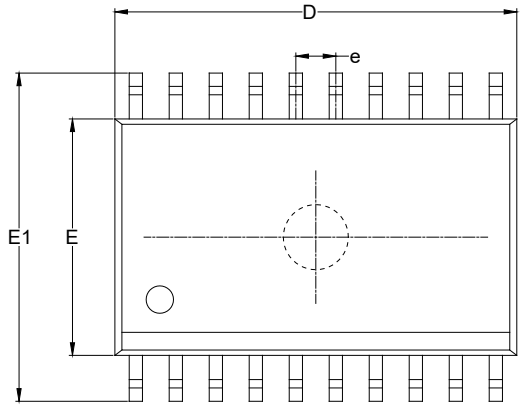
REVISION HISTORY

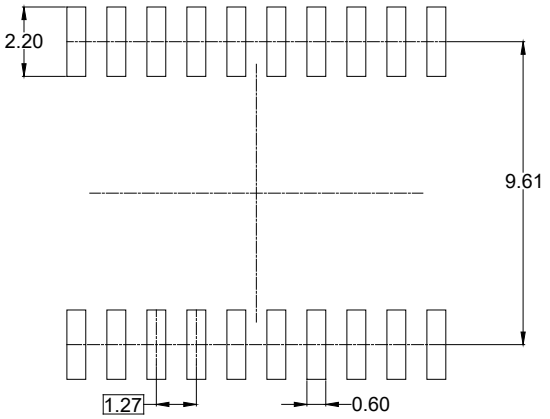
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original to REV.A (SEPTEMBER 2025)	Page
Changed from product preview to production data	All

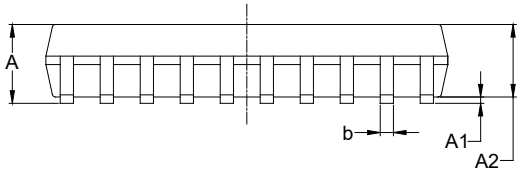
PACKAGE OUTLINE DIMENSIONS

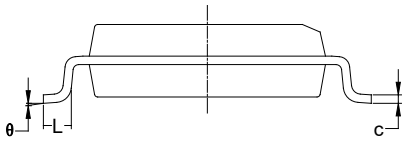
SOIC-20





RECOMMENDED LAND PATTERN (Unit: mm)



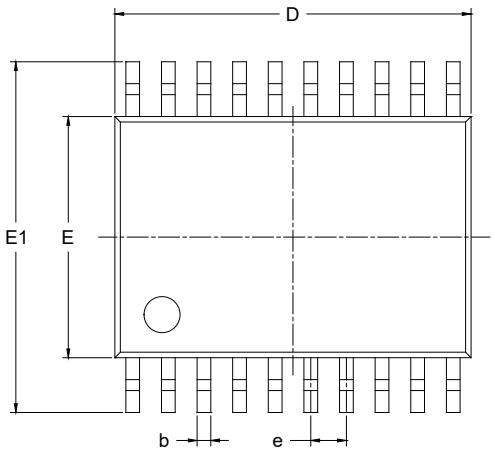


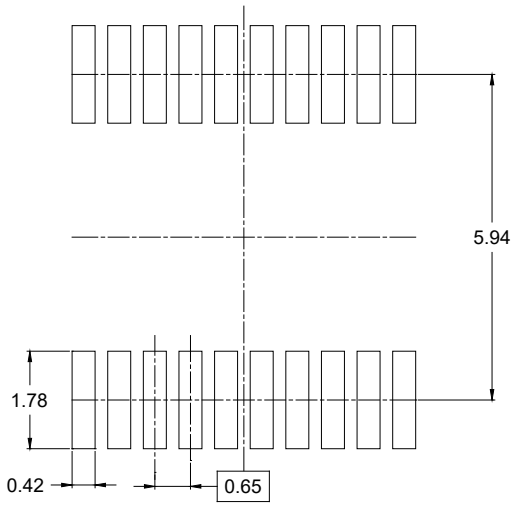
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	2.350	2.650	0.093	0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
c	0.204	0.330	0.008	0.013
D	12.520	13.000	0.493	0.512
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.27 BSC		0.050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

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

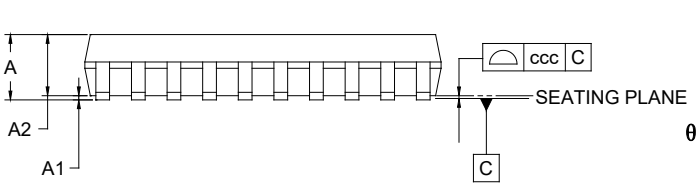
PACKAGE OUTLINE DIMENSIONS

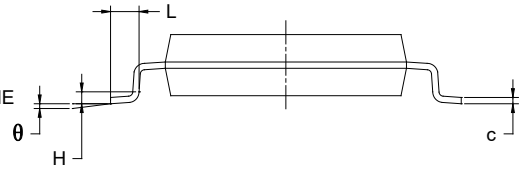
TSSOP-20





RECOMMENDED LAND PATTERN (Unit: mm)



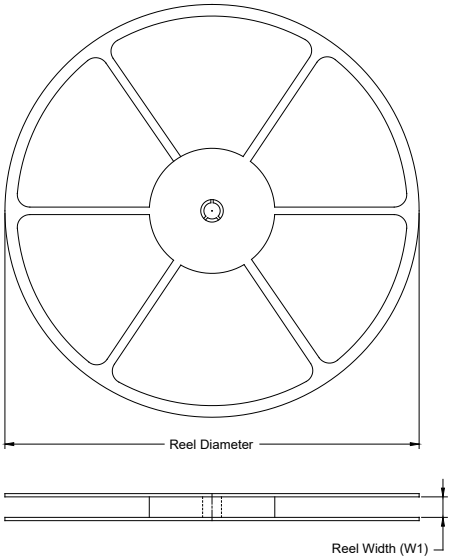


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	6.400	-	6.600
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

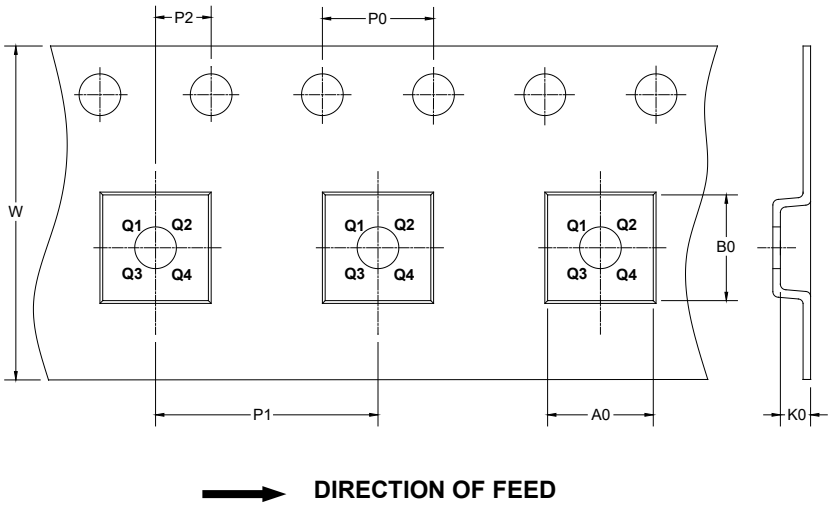
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



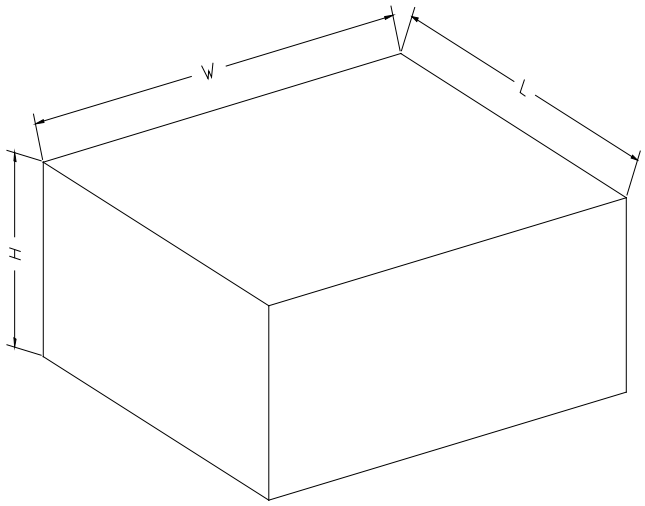
NOTE: The picture is only for reference. Please make the object as the standard.

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
TSSOP-20	13"	16.4	6.80	6.90	1.50	4.0	8.0	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