# GT74LVC244
# Octal Buffer With 3-State Output

| 1 Features | 2 Application |
|---|---|
| - 3-State output | - Servers |
| - Supports 5 V $V_{CC}$ operation | - LED displays |
| - Inputs accept voltages to 5.5 V | - Network switches |
| - Max $t_{pd}$ of 4.7 ns at 3.3 V | - Telecom infrastructure |
| - ±24-mA output drive at 3.3 V | - Motor drivers |
| - $I_{off}$ supports partial-power-down mode | - I/O expanders |

| 3 Description | Circuit Diagram |
|---|---|
| The operating voltage range of the bus buffer gate is 1.65 V to 5.5 V. The GT74LVC244 devices are designed for asynchronous communication between data buses. <br><br> To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to $V_{CC}$ through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver. <br><br> This device is fully specified for partial-power-down applications using $I_{off}$. The $I_{off}$ circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. |  |

## 4 Revision History

| Revision | Date | Note |
|---|---|---|
| Rev. A0. 1 | 2023. 09. 02 | Original Version |

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

# 5 Device Summary, Pin and Packages

**Table 5-1. Device Summary[1]**

| Serial Name | Part Name | Package | Body Size (Nom) | Marking[2] | MSL[3] | Package Qty |
|---|---|---|---|---|---|---|
| GT74LVC244 | GT74LVC244TG | TSSOP20 | 6.50mm×4.40mm×1.20mm | GT74LVC244 XXXXXXX | 3 | Tape and Reel 4000 |
| | GT74LVC244PG | SOP20 | 12.80mm×7.50mm×2.50mm | GT74LVC244 XXXXXXX | 3 | Tape and Reel 2000 |

(1) For all available packages, please contact product sales.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

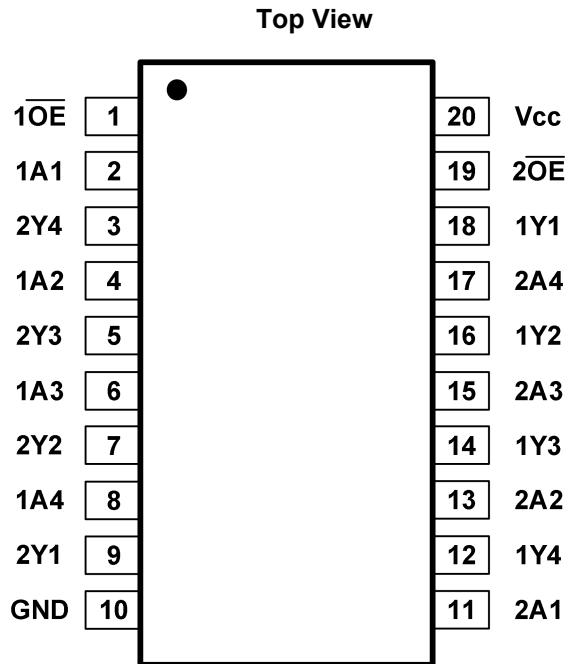(4) "XXXXX" in Marking will be appeared as the batch code.

# 5 Device Summary, Pin and Packages(Continued)

**Top View**

| Pin | Name | | Pin | Name |
|---|---|---|---|---|
| 1 | 1$\overline{OE}$ | | 20 | Vcc |
| 2 | 1A1 | | 19 | 2$\overline{OE}$ |
| 3 | 2Y4 | | 18 | 1Y1 |
| 4 | 1A2 | | 17 | 2A4 |
| 5 | 2Y3 | | 16 | 1Y2 |
| 6 | 1A3 | | 15 | 2A3 |
| 7 | 2Y2 | | 14 | 1Y3 |
| 8 | 1A4 | | 13 | 2A2 |
| 9 | 2Y1 | | 12 | 1Y4 |
| 10 | GND | | 11 | 2A1 |

**Fig.5-1. GT74LVC244:TG (TSSOP20) Package**

**GT74LVC244:PG (SOP20) Package**

# 5 Device Summary, Pin and Packages(Continued)

**Table 5-2 TG Pin Definition**

| Pin | | I/O | Description |
|---|---|---|---|
| **Name** | **TG/PG** | | |
| 1$\overline{\text{OE}}$ | 1 | I | Output Enable (Active Low) Pull 1$\overline{\text{OE}}$ high to place all outputs in 3-state mode. |
| 1A1 | 2 | I | Input |
| 2Y4 | 3 | O | Output |
| 1A2 | 4 | I | Input |
| 2Y3 | 5 | O | Output |
| 1A3 | 6 | I | Input |
| 2Y2 | 7 | O | Output |
| 1A4 | 8 | I | Input |
| 2Y1 | 9 | O | Output |
| GND | 10 | — | Ground |
| 2A1 | 11 | I | Input |
| 1Y4 | 12 | O | Output |
| 2A2 | 13 | I | Input |
| 1Y3 | 14 | O | Output |
| 2A3 | 15 | I | Input |
| 1Y2 | 16 | O | Output |
| 2A4 | 17 | I | Input |
| 1Y1 | 18 | O | Output |
| 2$\overline{\text{OE}}$ | 19 | I | Output Enable (Active Low) Pull 2$\overline{\text{OE}}$ high to place all outputs in 3-state mode. |
| V$_{\text{CC}}$ | 20 | — | Positive Supply |

# 6 Voltage, Temperature, ESD and Thermal Ratings

## 6.1 Absolute Maximum Ratings[(1)]

| Parameters | | Min | Max. | Unit |
|---|---|---|---|---|
| $V_{CC}$ | Supply voltage range | | -0.5 | 6 | V |
| $V_I$ | Input voltage range[(2)] | | -0.5 | 6 | V |
| $V_O$ | Voltage range applied to any output in the high-impedance or power-off state[(2)] | | -0.5 | 6 | V |
| $V_O$ | Voltage range applied to any output in the high or low state[(2)(3)] | | -0.5 | $V_{CC}$+0.5 | V |
| $I_{IK}$ | Input clamp current | $V_I<0$ | | -50 | mA |
| $I_{OK}$ | Output clamp current | $V_O<0$ | | -50 | mA |
| $I_O$ | Continuous output current | | | ±50 | mA |
| | Continuous current through $V_{CC}$ or GND | | | ±100 | mA |
| $T_J$ | Junction temperature under bias | | | 150 | ˚C |
| $T_{stg}$ | Storage temperature range | | -65 | 150 | ˚C |

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

## 6.2 ESD Ratings

| ESD | | | Value | Unit |
|---|---|---|---|---|
| V(ESD) | Electrostatic discharge | Human-Body Model (HBM)[(1)] | 8k | V |
| | | Charged-Device Model (CDM)[(2)] | 2k | V |

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

# 6 Voltage, Temperature, ESD and Thermal Ratings(Continued)

## 6.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | | 1.65 | 5.5 | V |
| $V_I$ | Input voltage | | 0 | 5.5 | V |
| $V_O$ | Output voltage | | 0 | $V_{CC}$ | V |
| $V_{IH}$ | High-level input voltage | $V_{CC}$=1.65V to 1.95V | 0.65×$V_{CC}$ | | V |
| | | $V_{CC}$=2.3V to 2.7V | 1.7 | | |
| | | $V_{CC}$=3V to 3.6V | 2 | | |
| | | $V_{CC}$=4.5V to 5.5V | 0.7×$V_{CC}$ | | |
| $V_{IL}$ | Low-level input voltage | $V_{CC}$=1.65V to 1.95V | | 0.35×$V_{CC}$ | V |
| | | $V_{CC}$=2.3V to 2.7V | | 0.7 | |
| | | $V_{CC}$=3V to 3.6V | | 0.8 | |
| | | $V_{CC}$=4.5V to 5.5V | | 0.3×$V_{CC}$ | |
| $I_{OH}$ | High-level output current | $V_{CC}$=1.65V | | -4 | mA |
| | | $V_{CC}$=2.3V | | -8 | |
| | | $V_{CC}$=3V | | -16 | |
| | | | | -24 | |
| | | $V_{CC}$=4.5V | | -32 | |
| $I_{OL}$ | Low-level output current | $V_{CC}$=1.65V | | 4 | mA |
| | | $V_{CC}$=2.3V | | 8 | |
| | | $V_{CC}$=3V | | 16 | |
| | | | | 24 | |
| | | $V_{CC}$=4.5V | | 32 | |
| $T_A$ | Operating free-air temperature | | -40 | 125 | ℃ |

## 6.4 Thermal Information

| Package Type | $\theta_{JA}$ | $\theta_{JC}$ | Unit |
|---|---|---|---|
| TSSOP20 | 102.5 | 35.9 | °C/W |
| SOP20 | 90.9 | 55.3 | °C/W |

# 7 Electrical Specifications

All typical values are at $V_{CC}$=3.3V, $T_A$=+25°C

| Parameter | | Test conditions | Vcc | –40°C to 85°C | | | –40°C to 125°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Min | Typ | Min | Typ | |
| $V_{OH}$ | | $I_{OH}$=–100 µA | 1.65 V to 5.5 V | $V_{CC}$-0.1 | | | $V_{CC}$-0.1 | | | V |
| | | $I_{OH}$=–4 mA | 1.65 V | 1.2 | | | 1.2 | | | |
| | | $I_{OH}$=–8 mA | 2.3 V | 1.9 | | | 1.9 | | | |
| | | $I_{OH}$=–16 mA | 3 V | 2.4 | | | 2.4 | | | |
| | | $I_{OH}$=–24 mA | | 2.3 | | | 2.3 | | | |
| | | $I_{OH}$=–32 mA | 4.5 V | 3.8 | | | 3.8 | | | |
| $V_{OL}$ | | $I_{OL}$=100 µA | 1.65 V to 5.5 V | | | 0.1 | | | 0.1 | V |
| | | $I_{OL}$=4 mA | 1.65 V | | | 0.45 | | | 0.45 | |
| | | $I_{OL}$=8 mA | 2.3 V | | | 0.3 | | | 0.3 | |
| | | $I_{OL}$=16 mA | 3 V | | | 0.4 | | | 0.4 | |
| | | $I_{OL}$=24 mA | | | | 0.55 | | | 0.55 | |
| | | $I_{OL}$=32 mA | 4.5 V | | | 0.55 | | | 0.55 | |
| $I_I$ | A or $\overline{OE}$ | $V_I$=5.5 V or GND | 0 to 5.5 V | | | ±5 | | | ±5 | µA |
| | Input | | | | | | | | | |
| $I_{off}$ | | $V_I$ or $V_O$=5.5 V | 0 | | | ±10 | | | ±10 | µA |
| $I_{OZ}$ | | VO=0 to 5.5 V | 3.6 V | | | 10 | | | 10 | µA |
| $I_{CC}$ | | $V_I$=5.5 V or GND, $I_O$=0 | 1.65 V to 5.5 V | | | 10 | | | 10 | µA |
| $\Delta I_{CC}$ | | One Input at $V_{CC}$ – 0.6 V, Other Inputs at $V_{CC}$ or GND | 3 V to 5.5 V | | | 500 | | | 500 | µA |
| $C_i$ | | $V_I$=$V_{CC}$ or GND | 3.3 V | | 5 | | | 5 | | pF |

(1) All unused digital inputs of the device must be held at $V_{IO}$ or GND to ensure proper device operation.

## 7 Electrical Specifications(Continued)

Typical Values at $T_A$=+25°C and nominal voltages 1.8V, 2.5V, 3.3V, and 5.0V.

| Parameter | From (Input) | To (Output) | −40°C to 125°C | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $V_{CC}$=1.8 V ± 0.15 V | | $V_{CC}$=2.5 V ± 0.15 V | | $V_{CC}$=3.3 V ± 0.15 V | | $V_{CC}$=5 V ± 0.15 V | | |
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| $t_{pd}$ | A | Y | 2.8 | 9.5 | 1.2 | 5.8 | 1 | 4.7 | 1 | 3.2 | ns |
| $t_{en}$ | $\overline{OE}$ | Y | 3.3 | 10.8 | 1.5 | 6.9 | 1 | 5.6 | 1 | 5.2 | ns |
| $t_{dis}$ | $\overline{OE}$ | Y | 1.3 | 11.8 | 1 | 5.2 | 1 | 5.2 | 1 | 4.4 | ns |

$T_A$=25°C

| Parameter | | Test Conditions | $V_{CC}$=1.8 V | $V_{CC}$=2.5 V | $V_{CC}$=3.3 V | $V_{CC}$=5 V | Unit |
|---|---|---|---|---|---|---|---|
| | | | Typ | Typ | Typ | Typ | |
| $C_{pd}$ | Power Dissipation Capacitance | f=10 MHz | 17 | 18 | 25 | 30 | pF |

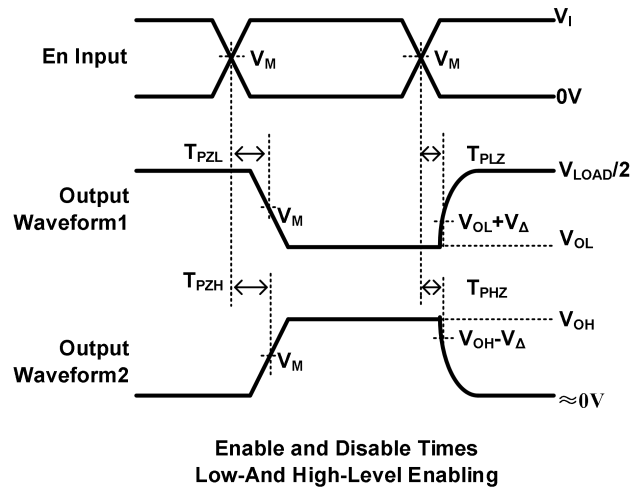# 8 Typical Characteristics
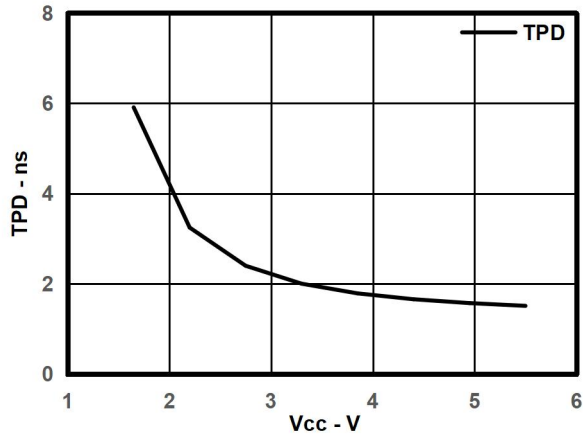


Fig.8-1.Typical Tpd vs Vcc
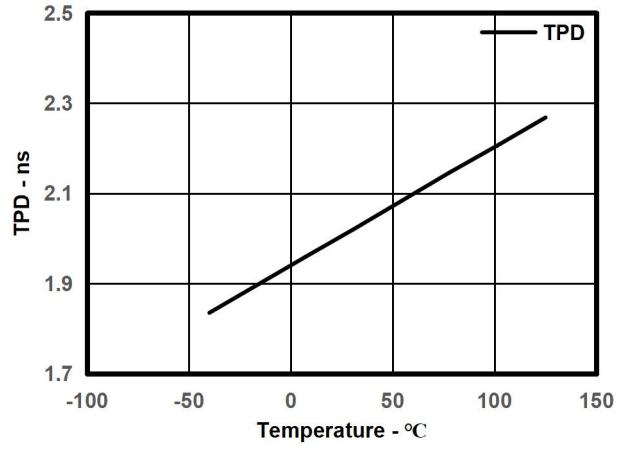


Fig.8-2.Typical Tpd vs Temp

# 9 Measurement Information



**Load Circuits**
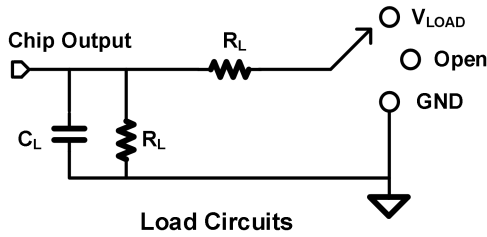
| TEST | S1 |
|---|---|
| $T_{PHL}/T_{PLH}$ | OPEN |
| $T_{PLZ}/T_{PZL}$ | $V_{LOAD}$ |
| $T_{PHZ}/T_{PZH}$ | GND |

| $V_{CC}$ | Inputs | | $V_M$ | $V_{LOAD}$ | $C_L$ | $R_L$ | $V_\Delta$ |
|---|---|---|---|---|---|---|---|
| | $V_I$ | $T_r/T_f$ | | | | | |
| 1.8V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2×$V_{CC}$ | 30pF | 1kΩ | 0.15V |
| 2.5V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2×$V_{CC}$ | 30pF | 500Ω | 0.15V |
| 3.3V±0.15V | 3V | ≤2.5ns | 1.5V | 6V | 50pF | 500Ω | 0.3V |
| 5V±0.15V | $V_{CC}$ | ≤2.5ns | $V_{CC}/2$ | 2×$V_{CC}$ | 50pF | 500Ω | 0.3V |



**Period Time**



**Setup and Hold Times**



**Propagation Delay
for Output and Inverted Output**



**Enable and Disable Times
Low-And High-Level Enabling**
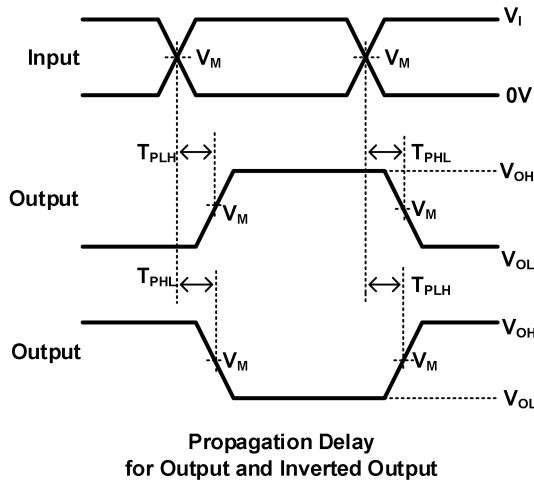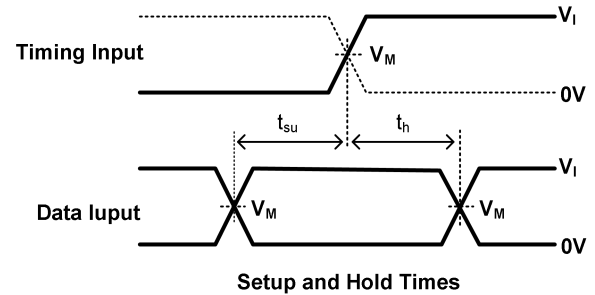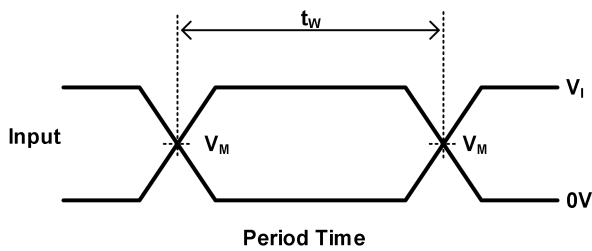
Notes: A.  $C_L$ includes probe and jig capacitance.
   B.  Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
   C.  All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, Z = 50Ω.

D.  The outputs are measured one at a time, with one transition per measurement.
E.  $t_{PLZ}$ and $t_{PHZ}$ are the same as $t_{dis}$ .
F.  $t_{PZL}$ and $t_{PZH}$ are the same as $t_{en}$ .
G.  $t_{PLH}$ and $t_{PHL}$ are the same as $t_{pd}$ .
H.  All parameters and waveforms are not applicable to all devices.

# 10 Detailed Description

## 10.1 Overview

The GT74LVC244 device is organized as two 4-bit buffers/line drivers with separate output-enable ($\overline{OE}$) inputs. The device passes data from the A inputs to the Y outputs when $\overline{OE}$ is low. The outputs are in the high-impedance state when $\overline{OE}$ is high. $\overline{OE}$ should be tied to $V_{CC}$ through a pullup resistor to ensure the high-impedance state during power up or power down; the minimum value of the resistor is determined by the current-sinking capability of the driver.
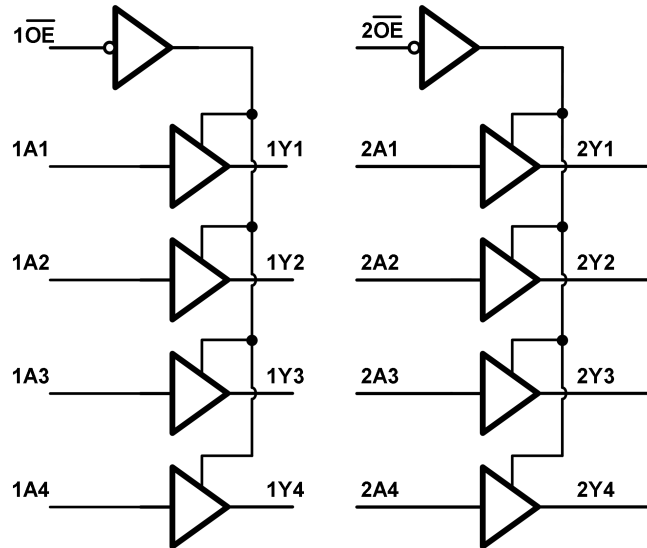
## 10.2 Functional Block Diagram



**Fig.10-1**

## 10.3 Feature Description

The GT74LVC244 have wide operating voltage range from 1.65 V to 5.5 V, It Allows down voltage translation and $I_{off}$ feature allows voltages on the inputs and outputs, when $V_{CC}$ is 0 V.

## 10.4 Device Functional Modes

**Table 10-1 Function Table**

| Inputs | | Output |
|:---:|:---:|:---:|
| $\overline{OE}$ | A | Y |
| L | H | H |
| L | L | L |
| H | X | Z |

# 11 Application Note

## 11.1 Application Information

GT74LVC244 is a high drive CMOS device that can be used for a multitude of bus interface type applications where output drive or PCB trace length is a concern. The inputs can accept voltages to 5.5 V at any valid $V_{CC}$ making it ideal for down translation.
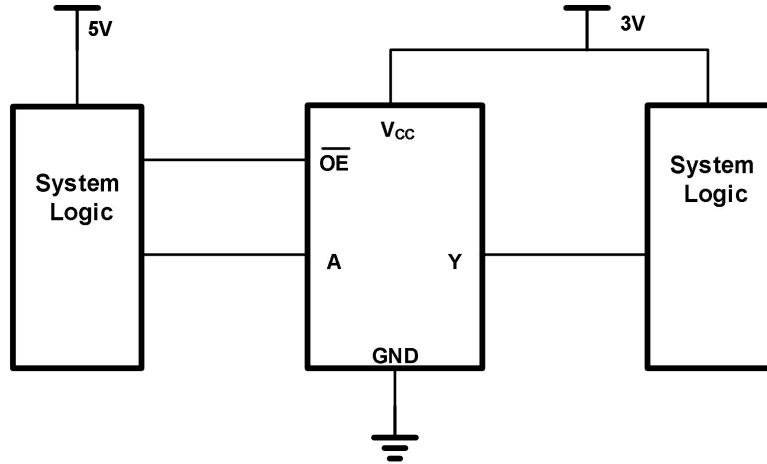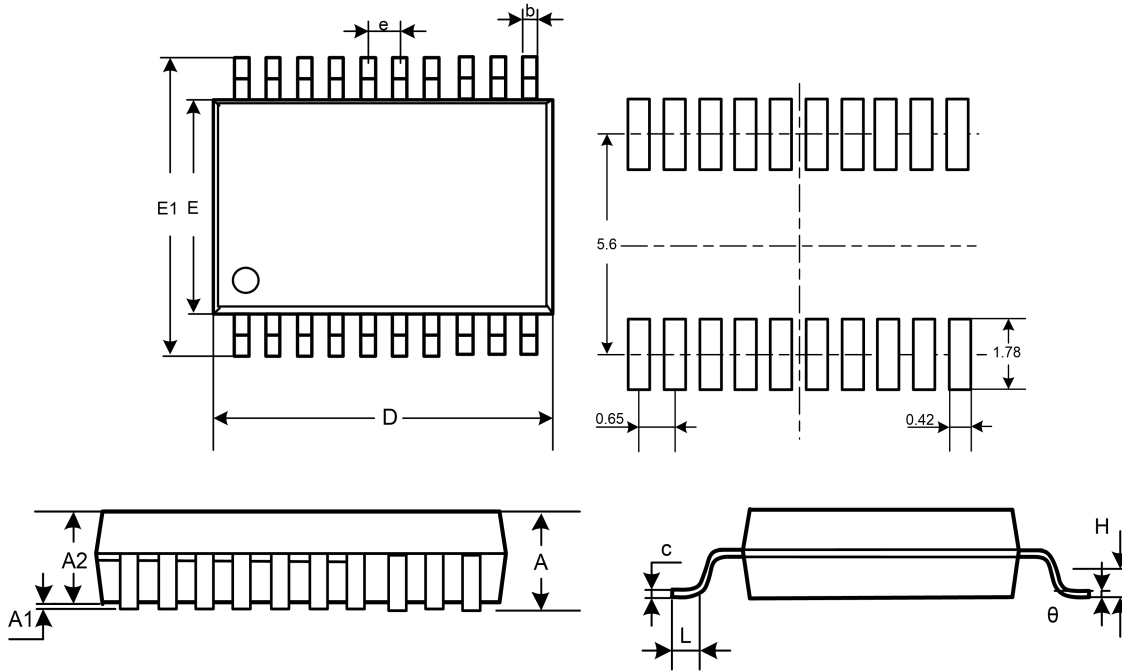
## 11.2 Typical Application



**Fig. 11-1**

## 12 Package Outline Dimension

TSSOP20



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | | 1.200 | | 0.047 |
| A1 | 0.050 | 0.150 | 0.002 | 0.006 |
| A2 | 0.800 | 1.050 | 0.031 | 0.041 |
| b | 0.200 | 0.280 | 0.008 | 0.011 |
| c | 0.130 | 0.170 | 0.005 | 0.007 |
| D | 6.400 | 6.600 | 0.252 | 0.260 |
| E | 4.300 | 4.500 | 0.169 | 0.177 |
| E1 | 6.200 | 6.600 | 0.244 | 0.260 |
| e | 0.650BSC | | 0.026BSC | |
| L | 0.450 | 0.750 | 0.018 | 0.030 |
| H | 0.250TYP | | 0.010TYP | |
| θ | 0° | 8° | 0° | 8° |

# 12 Package Outline Dimension (Continued)

**SOP20**
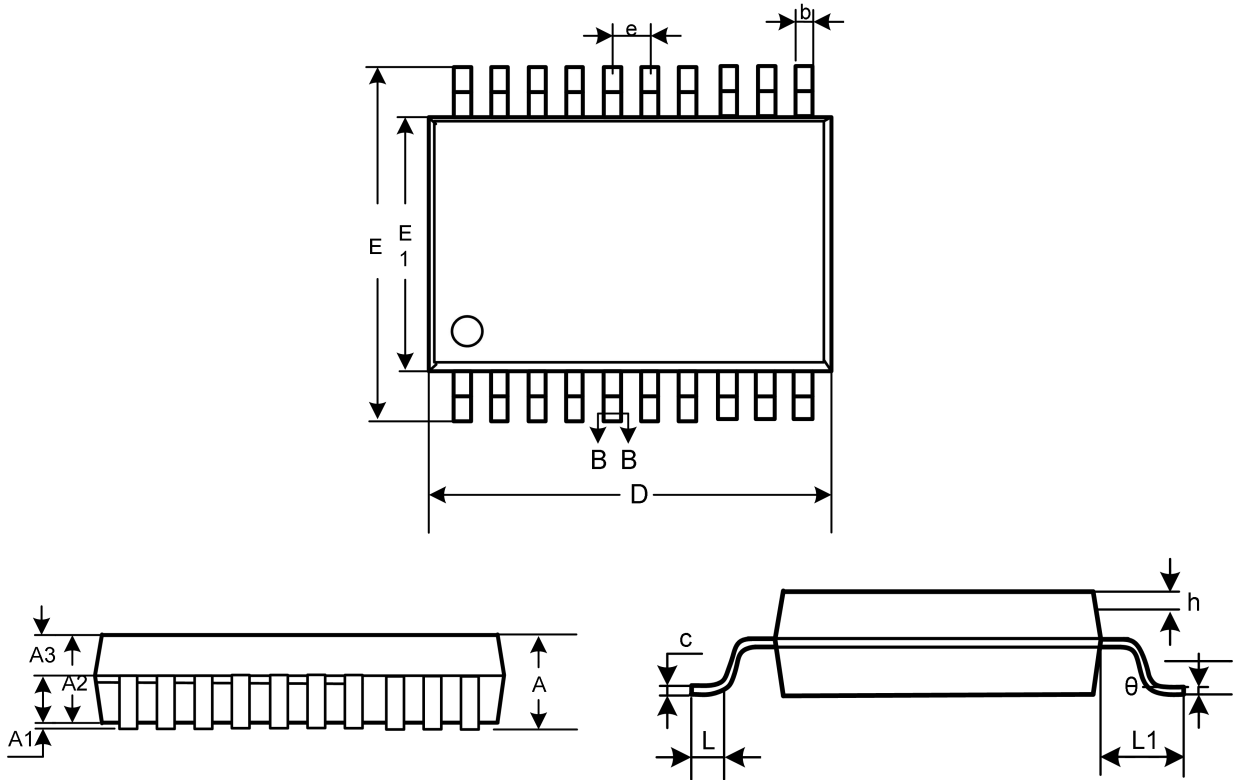
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|:---:|:---:|:---:|:---:|:---:|
| | Min | Max | Min | Max |
| A | -- | 2.65 | | 0.104 |
| A1 | 0.10 | 0.30 | 0.004 | 0.012 |
| A2 | 2.25 | 2.35 | 0.089 | 0.093 |
| A3 | 0.97 | 1.07 | 0.038 | 0.042 |
| b | 0.39 | 0.47 | 0.015 | 0.018 |
| c | 0.25 | 0.29 | 0.010 | 0.011 |
| D | 12.70 | 12.90 | 0.500 | 0.508 |
| E | 10.10 | 10.50 | 0.398 | 0.413 |
| E1 | 7.40 | 7.60 | 0.291 | 0.299 |
| e | 1.27BSC | | 4.17BSC | |
| L | 0.70 | 1.00 | 0.028 | 0.039 |
| L1 | 1.40REF | | 4.59REF | |
| θ | 0° | 8° | 0° | 8° |
| h | 0.50REF | | 1.64REF | |

# 13 TAPE AND REEL INFORMATION

## REEL DIMENSIONS

## REEL DIMENSIONS
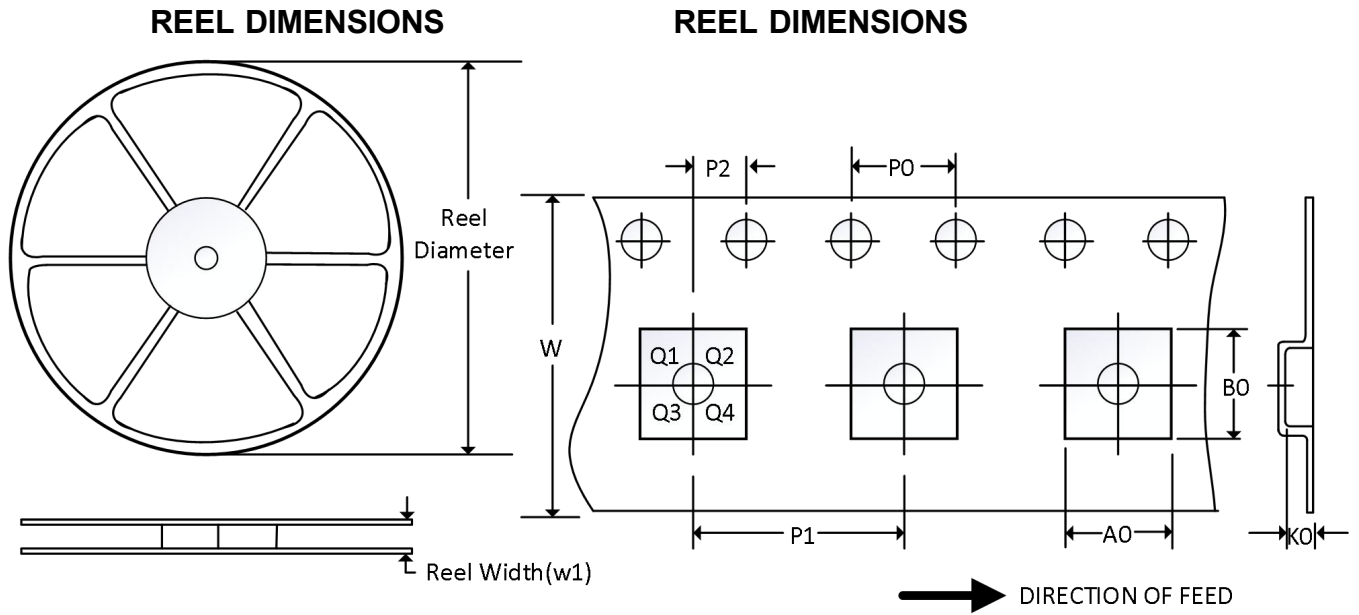


NOTE: The picture is only for reference. Please make the object as the standard.

## KEY PARAMETER LIST OF TAPE AND REEL

| Package Type | Reel Diameter | Reel Width(mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|
| TSSOP20 | 13'' | 12.4 | 6.75 | 6.95 | 1.2 | 4 | 8 | 2 | 16 | Q1 |
| SOP20 | 13'' | 24.4 | 10.75 | 13.55 | 2.65 | 4 | 12 | 2 | 24 | Q1 |

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.