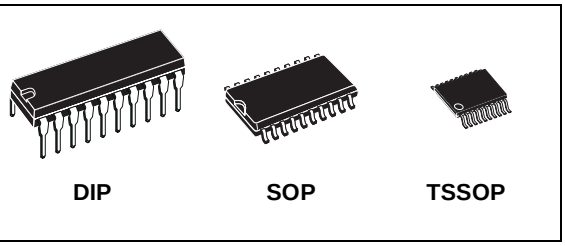
# 74ACT240

## OCTAL BUS BUFFER WITH 3 STATE OUTPUTS (INVERTED)

- HIGH SPEED: $t_{PD}$ = 5ns (TYP.) at $V_{CC}$ = 5V
- LOW POWER DISSIPATION: $I_{CC}$ = 4µA(MAX.) at $T_A$=25°C
- COMPATIBLE WITH TTL OUTPUTS $V_{IH}$ = 2V (MIN.), $V_{IL}$ = 0.8V (MAX.)
- 50Ω TRANSMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE: $|I_{OH}| = I_{OL}$ = 24mA (MIN)
- BALANCED PROPAGATION DELAYS: $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE: $V_{CC}$ (OPR) = 4.5V to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 240
- IMPROVED LATCH-UP IMMUNITY



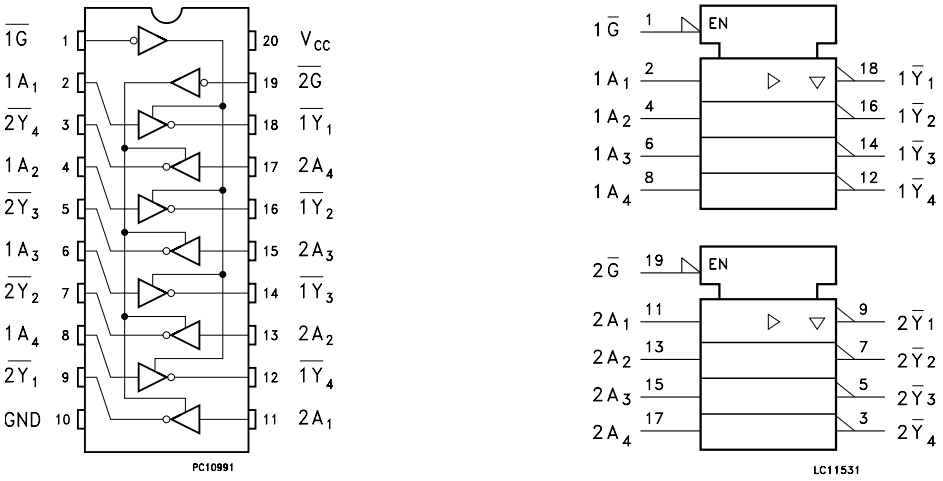

**ORDER CODES**

| PACKAGE | TUBE | T & R |
|---|---|---|
| DIP | 74ACT240B | |
| SOP | 74ACT240M | 74ACT240MTR |
| TSSOP | | 74ACT240TTR |

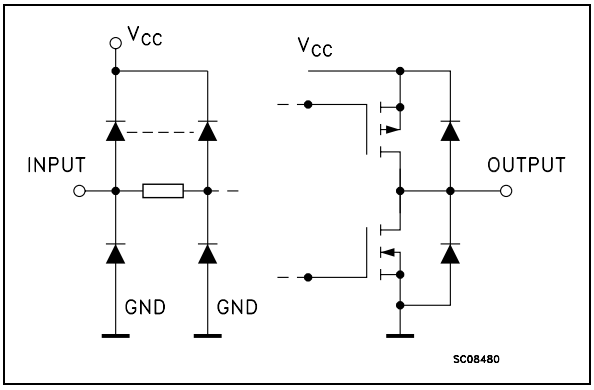
### DESCRIPTION

The 74ACT240 is an advanced high-speed CMOS OCTAL BUS BUFFER (3-STATE) fabricated with sub-micron silicon gate and double-layer metal wiring $C^2MOS$ tecnology.
$\overline{G}$ control output governs four BUS BUFFERs.
This device is designed to be used with 3 state memory address drivers, etc.
The device is designed to interface directly High Speed CMOS systems with TTL, NMOS and CMOS output voltage levels.
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



## INPUT AND OUTPUT EQUIVALENT CIRCUIT




## PIN DESCRIPTION

| PIN No | SYMBOL | NAME AND FUNCTION |
|---|---|---|
| 1 | $\overline{1G}$ | Output Enable Input |
| 2, 4, 6, 8 | 1A1 to 1A4 | Data Inputs |
| 9, 7, 5, 3 | $\overline{2Y1}$ to $\overline{2Y4}$ | Data Outputs |
| 11, 13, 15, 17 | 2A1 to 2A4 | Data Inputs |
| 18, 16, 14, 12 | $\overline{1Y1}$ to $\overline{1Y4}$ | Data Outputs |
| 19 | $\overline{2G}$ | Output Enable Input |
| 10 | GND | Ground (0V) |
| 20 | $V_{CC}$ | Positive Supply Voltage |

## TRUTH TABLE

| INPUTS | | OUTPUT |
|---|---|---|
| $\overline{G}$ | An | $\overline{Yn}$ |
| L | L | H |
| L | H | L |
| H | X | Z |

X : Don't Care
Z : High Impedance

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Supply Voltage | -0.5 to +7 | V |
| $V_I$ | DC Input Voltage | -0.5 to $V_{CC}$ + 0.5 | V |
| $V_O$ | DC Output Voltage | -0.5 to $V_{CC}$ + 0.5 | V |
| $I_{IK}$ | DC Input Diode Current | ± 20 | mA |
| $I_{OK}$ | DC Output Diode Current | ± 20 | mA |
| $I_O$ | DC Output Current | ± 50 | mA |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current | ± 400 | mA |
| $T_{stg}$ | Storage Temperature | -65 to +150 | °C |
| $T_L$ | Lead Temperature (10 sec) | 300 | °C |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

## RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Supply Voltage | 4.5 to 5.5 | V |
| $V_I$ | Input Voltage | 0 to $V_{CC}$ | V |
| $V_O$ | Output Voltage | 0 to $V_{CC}$ | V |
| $T_{op}$ | Operating Temperature | -55 to 125 | °C |
| dt/dv | Input Rise and Fall Time $V_{CC}$ = 4.5 to 5.5V (note 1) | 8 | ns/V |

1) $V_{IN}$ from 0.8V to 2.0V

## DC SPECIFICATIONS

| Symbol | Parameter | Test Condition | | Value | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_{CC}$ (V) | | $T_A$ = 25°C | | | -40 to 85°C | | -55 to 125°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | Max. | |
| $V_{IH}$ | High Level Input Voltage | 4.5 | $V_O$ = 0.1 V or $V_{CC}$-0.1V | 2.0 | 1.5 | | 2.0 | | 2.0 | | V |
| | | 5.5 | | 2.0 | 1.5 | | 2.0 | | 2.0 | | |
| $V_{IL}$ | Low Level Input Voltage | 4.5 | $V_O$ = 0.1 V or $V_{CC}$-0.1V | | 1.5 | 0.8 | | 0.8 | | 0.8 | V |
| | | 5.5 | | | 1.5 | 0.8 | | 0.8 | | 0.8 | |
| $V_{OH}$ | High Level Output Voltage | 4.5 | $I_O$=-50 µA | 4.4 | 4.49 | | 4.4 | | 4.4 | | V |
| | | 5.5 | $I_O$=-50 µA | 5.4 | 5.49 | | 5.4 | | 5.4 | | |
| | | 4.5 | $I_O$=-24 mA | 3.86 | | | 3.76 | | 3.7 | | V |
| | | 5.5 | $I_O$=-24 mA | 4.86 | | | 4.76 | | 4.7 | | |
| $V_{OL}$ | Low Level Output Voltage | 4.5 | $I_O$=50 µA | | 0.001 | 0.1 | | 0.1 | | 0.1 | V |
| | | 5.5 | $I_O$=50 µA | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | | 4.5 | $I_O$=24 mA | | | 0.36 | | 0.44 | | 0.5 | |
| | | 5.5 | $I_O$=24 mA | | | 0.36 | | 0.44 | | 0.5 | |
| $I_I$ | Input Leakage Current | 5.5 | $V_I$ = $V_{CC}$ or GND | | | ± 0.1 | | ± 1 | | ± 1 | µA |
| $I_{OZ}$ | High Impedance Output Leakege Current | 5.5 | $V_I$ = $V_{IH}$ or $V_{IL}$<br>$V_O$ = $V_{CC}$ or GND | | | ± 0.5 | | ± 5 | | ± 5 | mA |
| $I_{CCT}$ | Max $I_{CC}$/Input | 5.5 | $V_I$ = $V_{CC}$ - 2.1V | | 0.6 | | | 1.5 | | 1.6 | mA |
| $I_{CC}$ | Quiescent Supply Current | 5.5 | $V_I$ = $V_{CC}$ or GND | | | 4 | | 40 | | 80 | µA |
| $I_{OLD}$ | Dynamic Output Current (note 1, 2) | 5.5 | $V_{OLD}$ = 1.65 V max | | | | | 75 | | 50 | mA |
| $I_{OHD}$ | | | $V_{OHD}$ = 3.85 V min | | | | | -75 | | -50 | mA |

1) Maximum test duration 2ms, one output loaded at time
2) Incident wave switching is guaranteed on transmission lines with impedances as low as 50Ω

## AC ELECTRICAL CHARACTERISTICS ($C_L$ = 50 pF, $R_L$ = 500 Ω, Input $t_r$ = $t_f$ = 3ns)

| Symbol | Parameter | Test Condition | | Value | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_{CC}$ (V) | | $T_A$ = 25°C | | | -40 to 85°C | | -55 to 125°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | Max. | |
| $t_{PLH}$ $t_{PHL}$ | Propagation Delay Time | 5.0(*) | | 1.5 | 5.0 | 7.5 | 1.5 | 8.5 | 1.5 | 8.5 | ns |
| $t_{PZL}$ $t_{PZH}$ | Output Enable Time | 5.0(*) | | 1.5 | 6.0 | 8.5 | 1.5 | 9.5 | 1.5 | 9.5 | ns |
| $t_{PLZ}$ $t_{PHZ}$ | Output Disable Time | 5.0(*) | | 1.5 | 6.5 | 10.0 | 1.5 | 10.5 | 1.5 | 10.5 | ns |

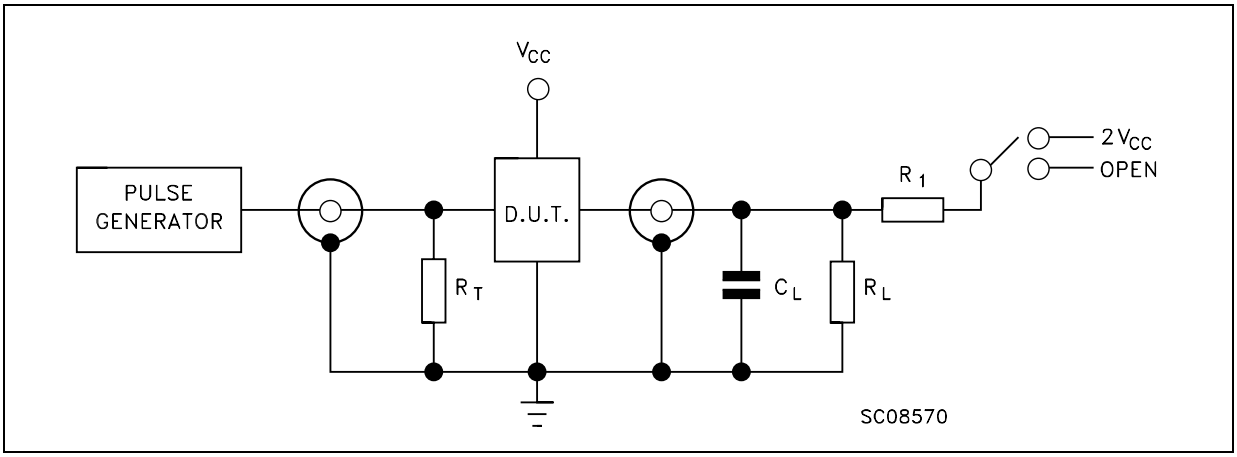
(*) Voltage range is 5.0V ± 0.5V

## CAPACITIVE CHARACTERISTICS

| Symbol | Parameter | Test Condition | | Value | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_{CC}$ (V) | | $T_A$ = 25°C | | | -40 to 85°C | | -55 to 125°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | Max. | |
| $C_{IN}$ | Input Capacitance | 5.0 | | | 4 | | | | | | pF |
| $C_{OUT}$ | Output Capacitance | 5.0 | | | 8 | | | | | | pF |
| $C_{PD}$ | Power Dissipation Capacitance (note 1) | 5.0 | $f_{IN}$ = 10MHz | | 21 | | | | | | pF |

1) $C_{PD}$ is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/n$ (per circuit)

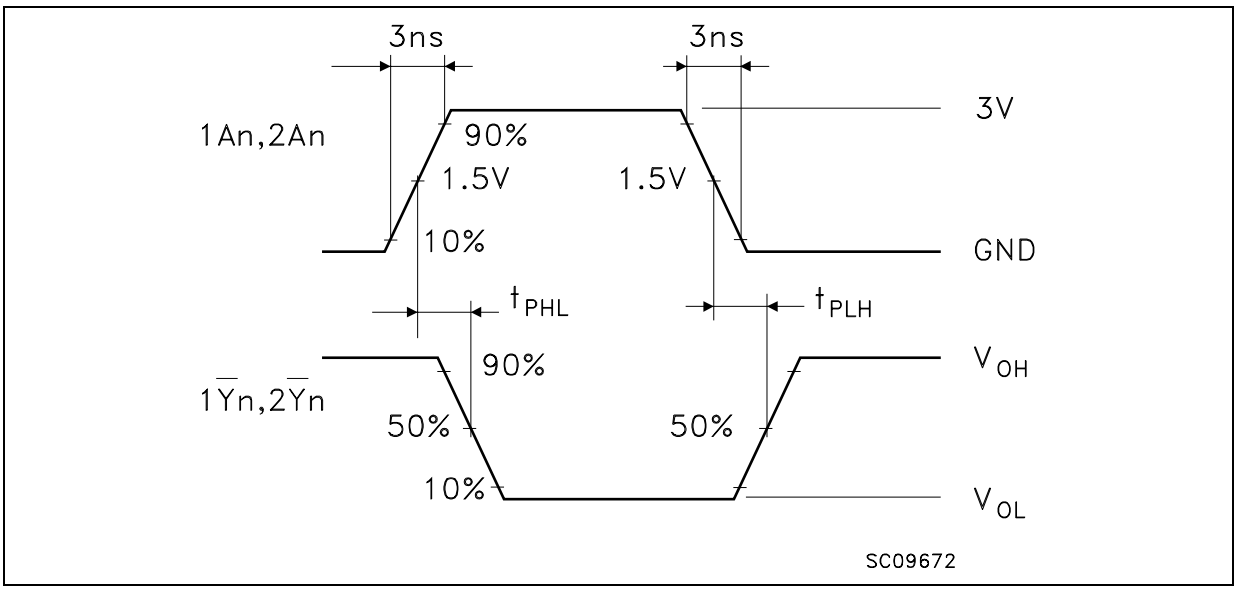
## TEST CIRCUIT



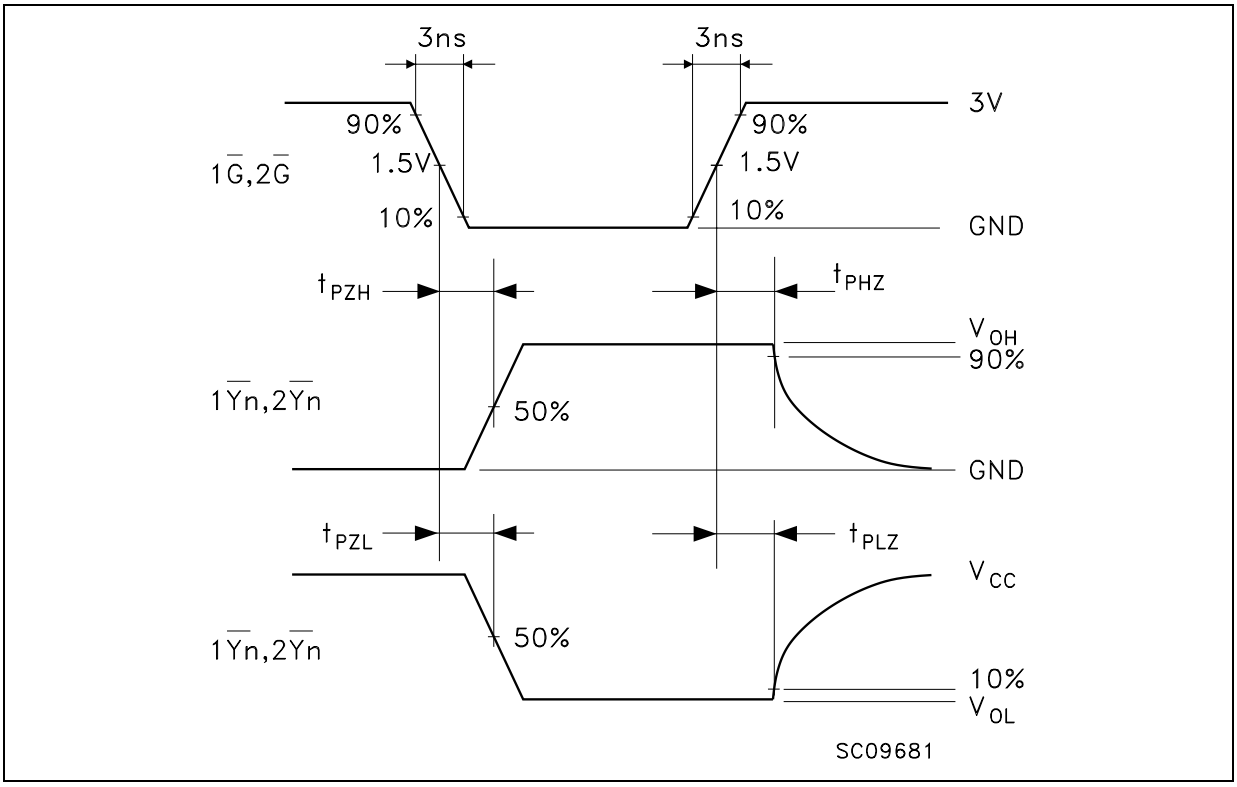

| TEST | SWITCH |
|---|---|
| $t_{PLH}$, $t_{PHL}$ | Open |
| $t_{PZL}$, $t_{PLZ}$ | $2V_{CC}$ |
| $t_{PZH}$, $t_{PHZ}$ | Open |

$C_L$ = 50pF or equivalent (includes jig and probe capacitance)
$R_L = R_1$ = 500Ω or equivalent
$R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

**WAVEFORM 1: PROPAGATION DELAYS** (f=1MHz; 50% duty cycle)

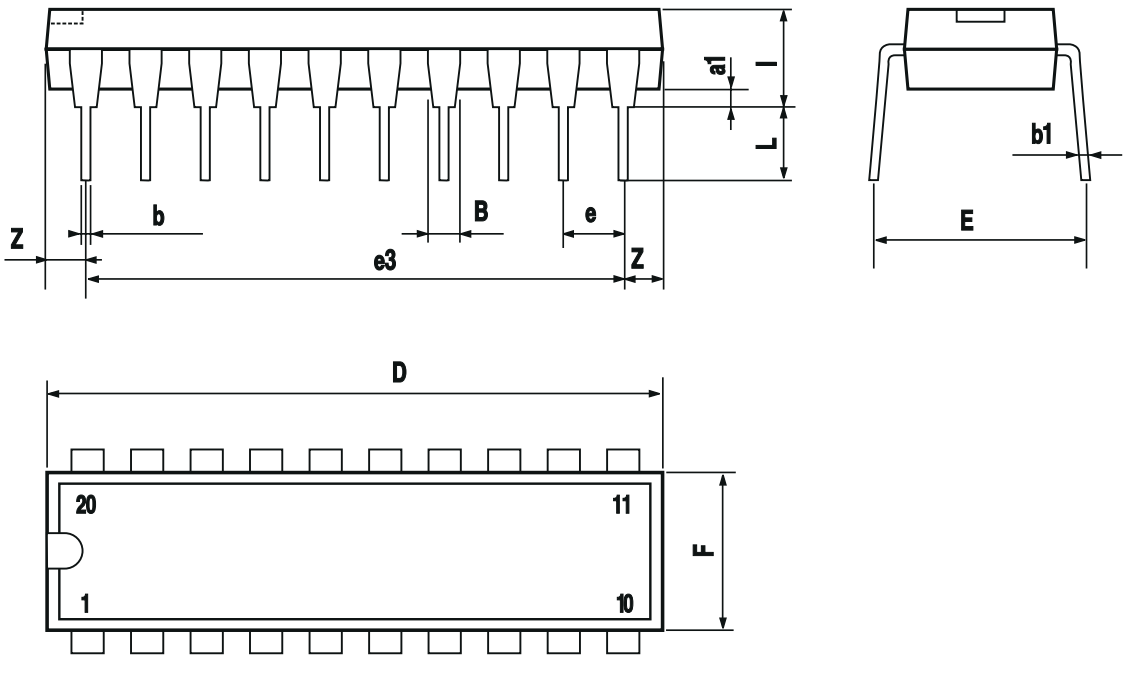



**WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME** (f=1MHz; 50% duty cycle)



## Plastic DIP-20 (0.25) MECHANICAL DATA

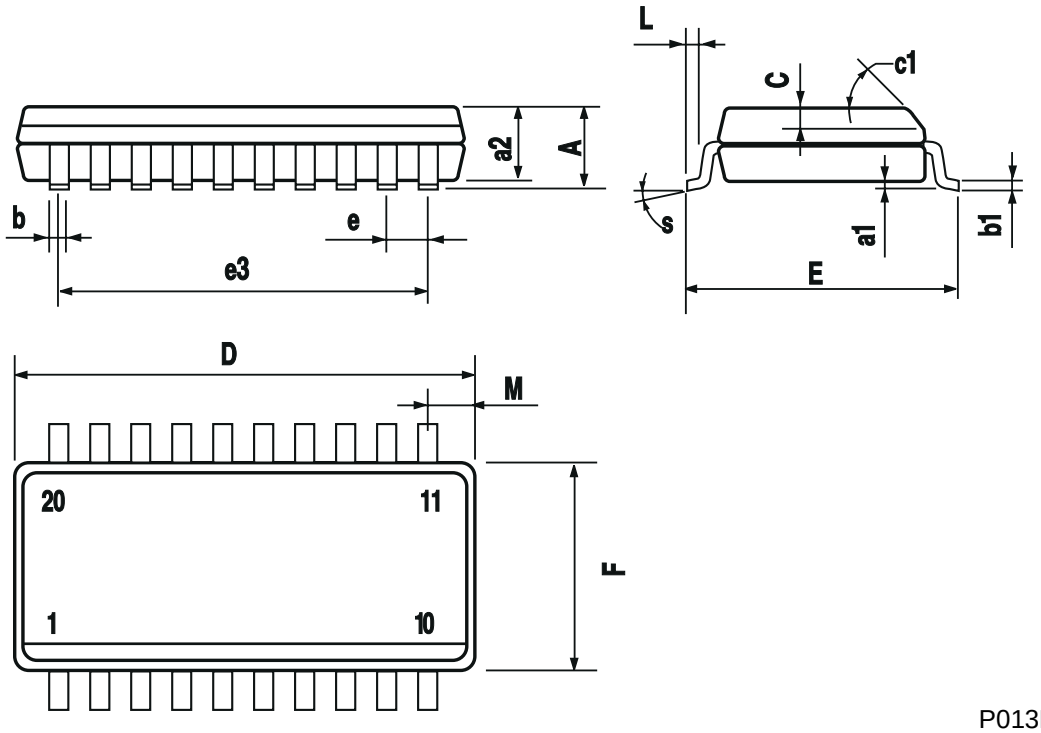
| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.254 | | | 0.010 | | |
| B | 1.39 | | 1.65 | 0.055 | | 0.065 |
| b | | 0.45 | | | 0.018 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 25.4 | | | 1.000 |
| E | | 8.5 | | | 0.335 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 22.86 | | | 0.900 | |
| F | | | 7.1 | | | 0.280 |
| I | | | 3.93 | | | 0.155 |
| L | | 3.3 | | | 0.130 | |
| Z | | | 1.34 | | | 0.053 |




P001J

## SO-20 MECHANICAL DATA

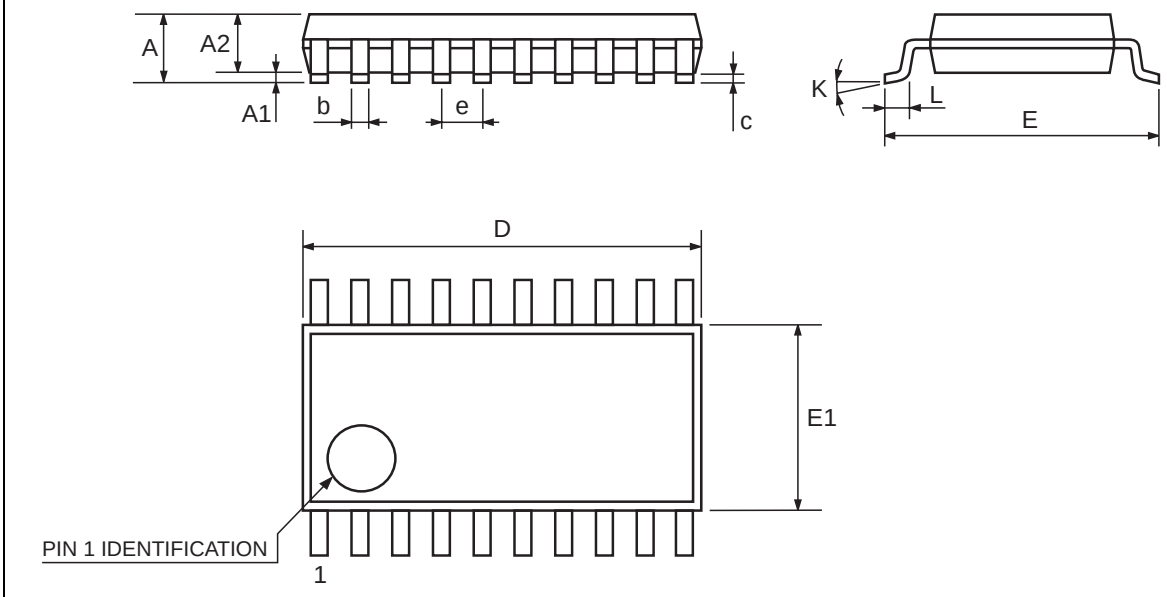
| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.10 | | 0.20 | 0.004 | | 0.007 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.013 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.012 |
| C | | 0.50 | | | 0.020 | |
| c1 | 45 (typ.) | | | | | |
| D | 12.60 | | 13.00 | 0.496 | | 0.512 |
| E | 10.00 | | 10.65 | 0.393 | | 0.419 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 11.43 | | | 0.450 | |
| F | 7.40 | | 7.60 | 0.291 | | 0.299 |
| L | 0.50 | | 1.27 | 0.19 | | 0.050 |
| M | | | 0.75 | | | 0.029 |
| S | 8 (max.) | | | | | |




P013L

## TSSOP20 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.1 | | | 0.433 |
| A1 | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 0.85 | 0.9 | 0.95 | 0.335 | 0.354 | 0.374 |
| b | 0.19 | | 0.30 | 0.0075 | | 0.0118 |
| c | 0.09 | | 0.2 | 0.0035 | | 0.0079 |
| D | 6.4 | 6.5 | 6.6 | 0.252 | 0.256 | 0.260 |
| E | 6.25 | 6.4 | 6.5 | 0.246 | 0.252 | 0.256 |
| E1 | 4.3 | 4.4 | 4.48 | 0.169 | 0.173 | 0.176 |
| e | | 0.65 BSC | | | 0.0256 BSC | |
| K | $0^o$ | $4^o$ | $8^o$ | $0^o$ | $4^o$ | $8^o$ |
| L | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |



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