



74AC245

OCTAL BUS TRANSCEIVER WITH 3 STATE OUTPUTS (NON INVERTED)

- HIGH SPEED: $t_{PD} = 4.5ns$ (TYP.) at $V_{CC} = 5V$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu A$ (MAX.) at $T_A=25^\circ C$
- HIGH NOISE IMMUNITY:
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (MIN.)
- 50Ω TRANSMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 24mA$ (MIN)
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \approx t_{PHL}$
- OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 244
- IMPROVED LATCH-UP IMMUNITY



ORDER CODES

| PACKAGE | TUBE | T & R |
|---------|----------|------------|
| DIP | 74AC245B | |
| SOP | 74AC245M | 74AC245MTR |
| TSSOP | | 74AC245TTR |

DESCRIPTION

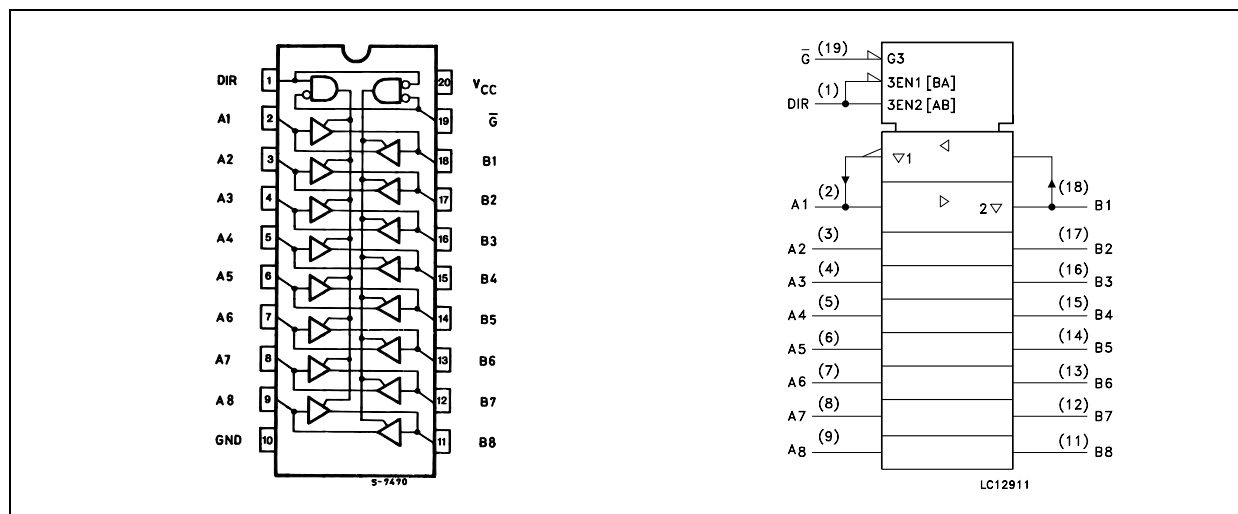
The 74AC245 is an advanced high-speed CMOS OCTAL BUS TRANSCEIVER (3-STATE) fabricated with sub-micron silicon gate and double-layer metal wiring C²MOS technology. This IC is intended for two-way asynchronous communication between data buses and the direction of data transmission is determined by

DIR input. The enable input \bar{G} can be used to disable the device so that the buses are effectively isolated..

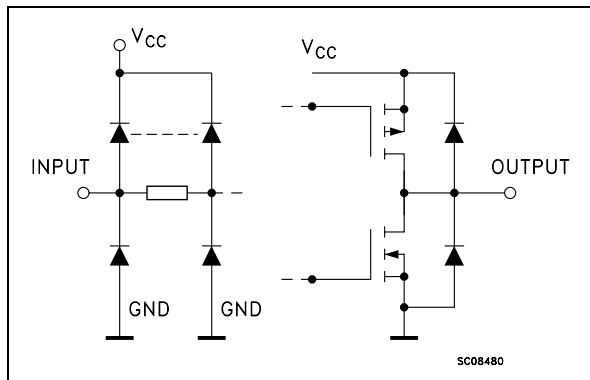
All floating bus terminals during HIGH-Z state must be held HIGH or LOW

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 | DIR | Directional Control |
| 2, 3, 4, 5, 6, 7, 8, 9 | A1 to A8 | Data Inputs/Outputs |
| 18, 17, 16, 15, 14, 13, 12, 11 | B1 to B8 | Data Inputs/Outputs |
| 19 | G | Output Enable Input |
| 10 | GND | Ground (0V) |
| 20 | V _{CC} | Positive Supply Voltage |

TRUTH TABLE

| INPUTS | | FUNCTION | | OUTPUT |
|----------------|-----|----------|--------|----------------|
| \overline{G} | DIR | A BUS | B BUS | Y _n |
| L | L | OUTPUT | INPUT | A = B |
| L | H | INPUT | OUTPUT | B = A |
| H | X | Z | Z | 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 | 2 to 6 | 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} = 3.0, 4.5 or 5.5V (note 1) | 8 | ns/V |

1) V_{IN} from 30% to 70% of V_{CC}

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 | 3.0 | V _O = 0.1 V or V _{CC} -0.1V | 2.1 | 1.5 | | 2.1 | | 2.1 | | V |
| | | 4.5 | | 3.15 | 2.25 | | 3.15 | | 3.15 | | |
| | | 5.5 | | 3.85 | 2.75 | | 3.85 | | 3.85 | | |
| V _{IL} | Low Level Input Voltage | 3.0 | V _O = 0.1 V or V _{CC} -0.1V | | 1.5 | 0.9 | | 0.9 | | 0.9 | V |
| | | 4.5 | | | 2.25 | 1.35 | | 1.35 | | 1.35 | |
| | | 5.5 | | | 2.75 | 1.65 | | 1.65 | | 1.65 | |
| V _{OH} | High Level Output Voltage | 3.0 | I _O =-50 μA | 2.9 | 2.99 | | 2.9 | | 2.9 | | V |
| | | 4.5 | I _O =-50 μA | 4.4 | 4.49 | | 4.4 | | 4.4 | | |
| | | 5.5 | I _O =-50 μA | 5.4 | 5.49 | | 5.4 | | 5.4 | | |
| | | 3.0 | I _O =-12 mA | 2.56 | | | 2.46 | | 2.4 | | |
| | | 4.5 | I _O =-24 mA | 3.86 | | | 3.76 | | 3.7 | | |
| | | 5.5 | I _O =-24 mA | 4.86 | | | 4.76 | | 4.7 | | |
| V _{OL} | Low Level Output Voltage | 3.0 | I _O =50 μA | | 0.002 | 0.1 | | 0.1 | | 0.1 | V |
| | | 4.5 | I _O =50 μA | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | | 5.5 | I _O =50 μA | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | | 3.0 | I _O =12 mA | | | 0.36 | | 0.44 | | 0.5 | |
| | | 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 Leakage Current | 5.5 | V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND | | | ± 0.5 | | ± 5 | | ± 10 | μA |
| 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

74AC245

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 | 3.3 ^(*) | | 1.5 | 5.5 | 8.5 | 1.5 | 9.0 | 1.5 | 11.5 | ns |
| | | 5.0 ^(**) | | 1.5 | 4.5 | 6.5 | 1.5 | 7.0 | 1.5 | 8.5 | |
| t _{PZL} t _{PZH} | Output Enable Time | 3.3 ^(*) | | 1.5 | 7.5 | 12.0 | 1.5 | 13.5 | 1.5 | 14.0 | ns |
| | | 5.0 ^(**) | | 1.5 | 5.5 | 9.0 | 1.5 | 9.5 | 1.5 | 10.5 | |
| t _{PLZ} t _{PHZ} | Output Disable Time | 3.3 ^(*) | | 1.5 | 6.2 | 12.0 | 1.5 | 13.0 | 1.5 | 14.0 | ns |
| | | 5.0 ^(**) | | 1.5 | 5.2 | 9.0 | 1.5 | 10.0 | 1.5 | 10.5 | |

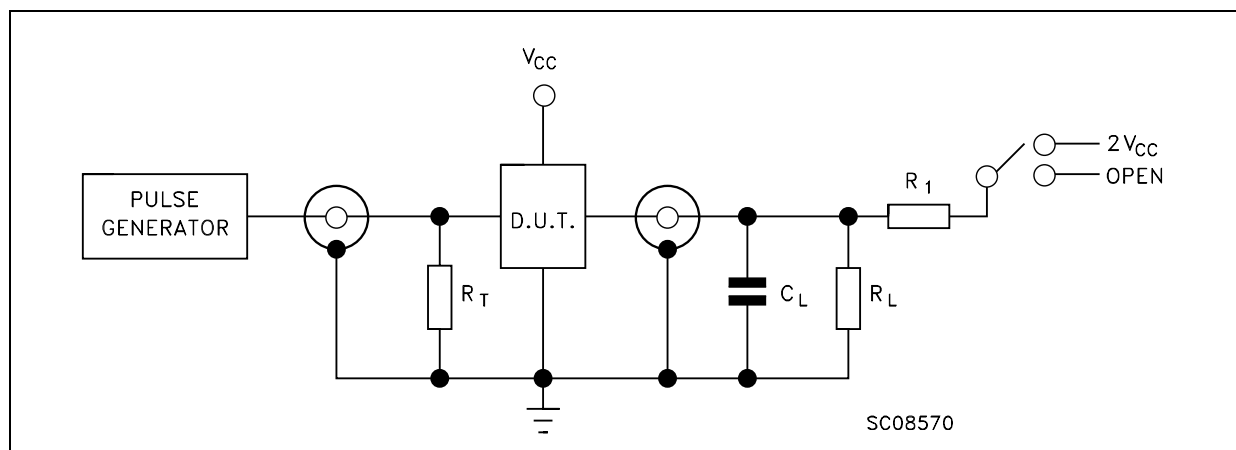
(*) Voltage range is 3.3V ± 0.3V
 (**) Voltage range is 5.0V ± 0.5V

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 | | | 5 | | | | | | pF |
| C _{I/O} | I/O Capacitance | 5.0 | | | 10 | | | | | | pF |
| C _{PD} | Power Dissipation Capacitance (note 1) | 5.0 | f _{IN} = 10MHz | | 21 | | | | | | pF |

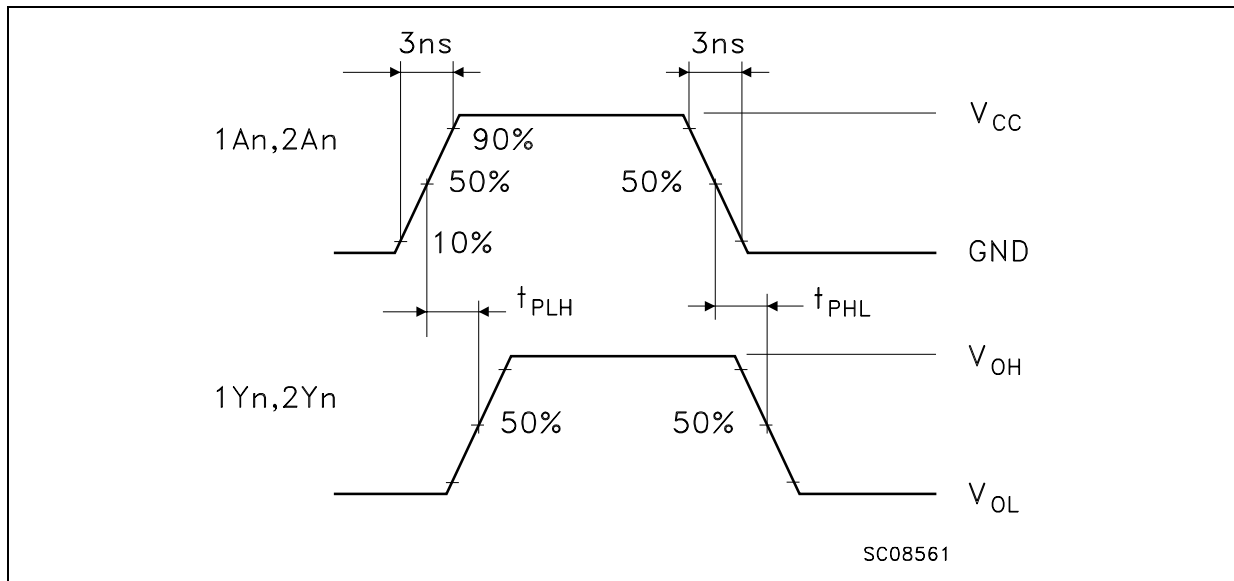
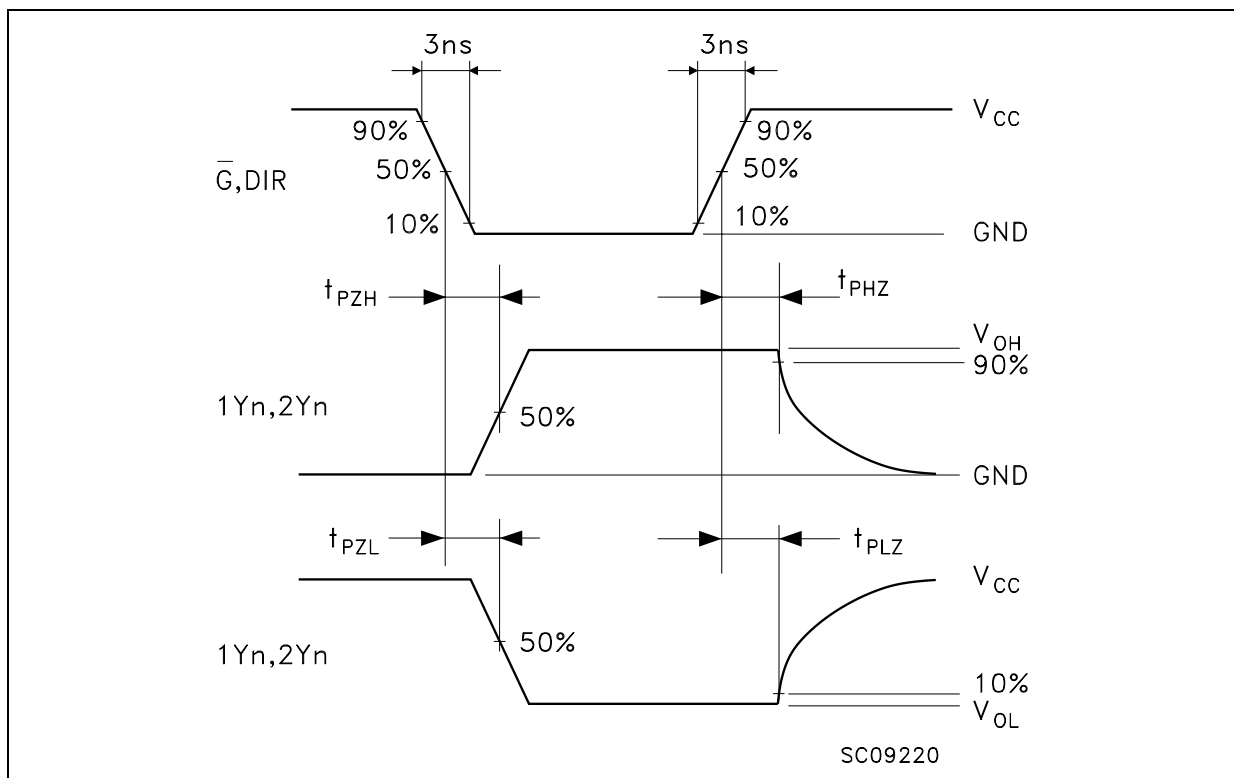
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I_{CC(oper)} = C_{PD} × V_{CC} × f_{IN} + I_{CC}/16 (per 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 = R₁ = 500Ω or equivalent
 R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM 1: PROPAGATION DELAYS ($f=1\text{MHz}$; 50% duty cycle)**WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME** ($f=1\text{MHz}$; 50% duty cycle)

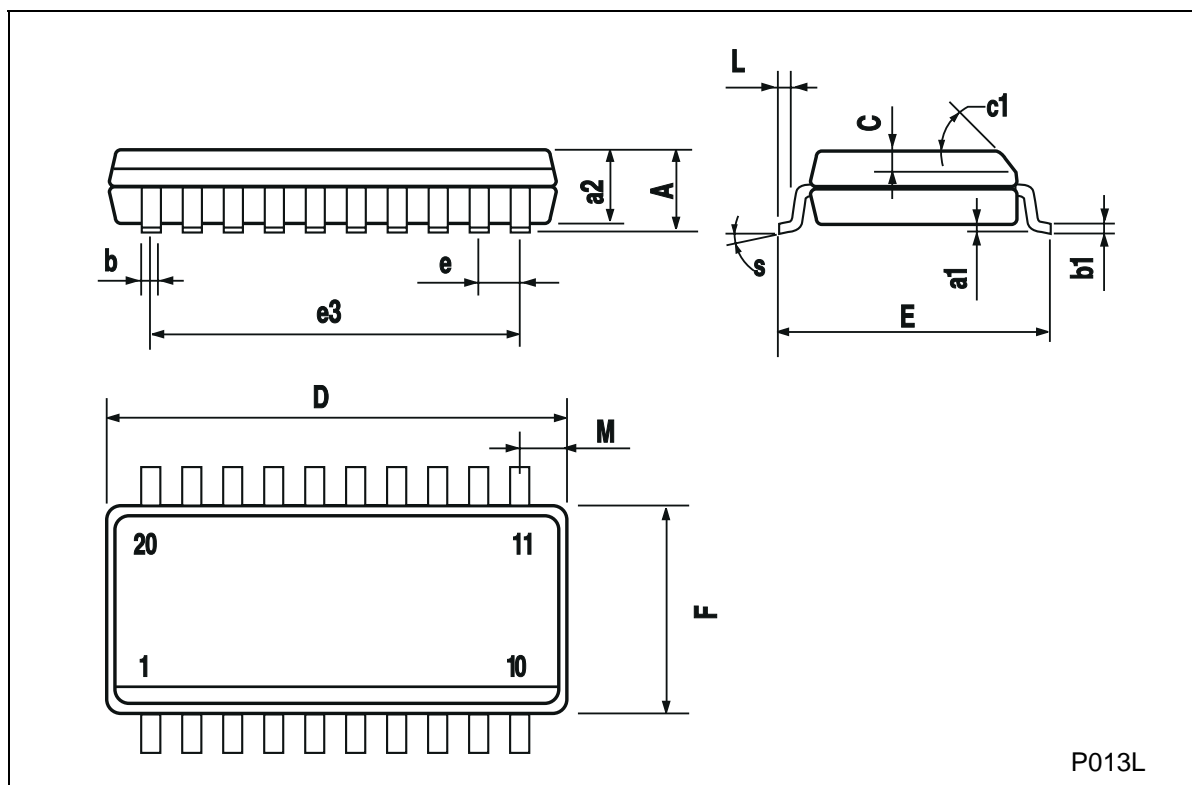
Plastic DIP-20 (0.25) MECHANICAL DATA

| 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 |



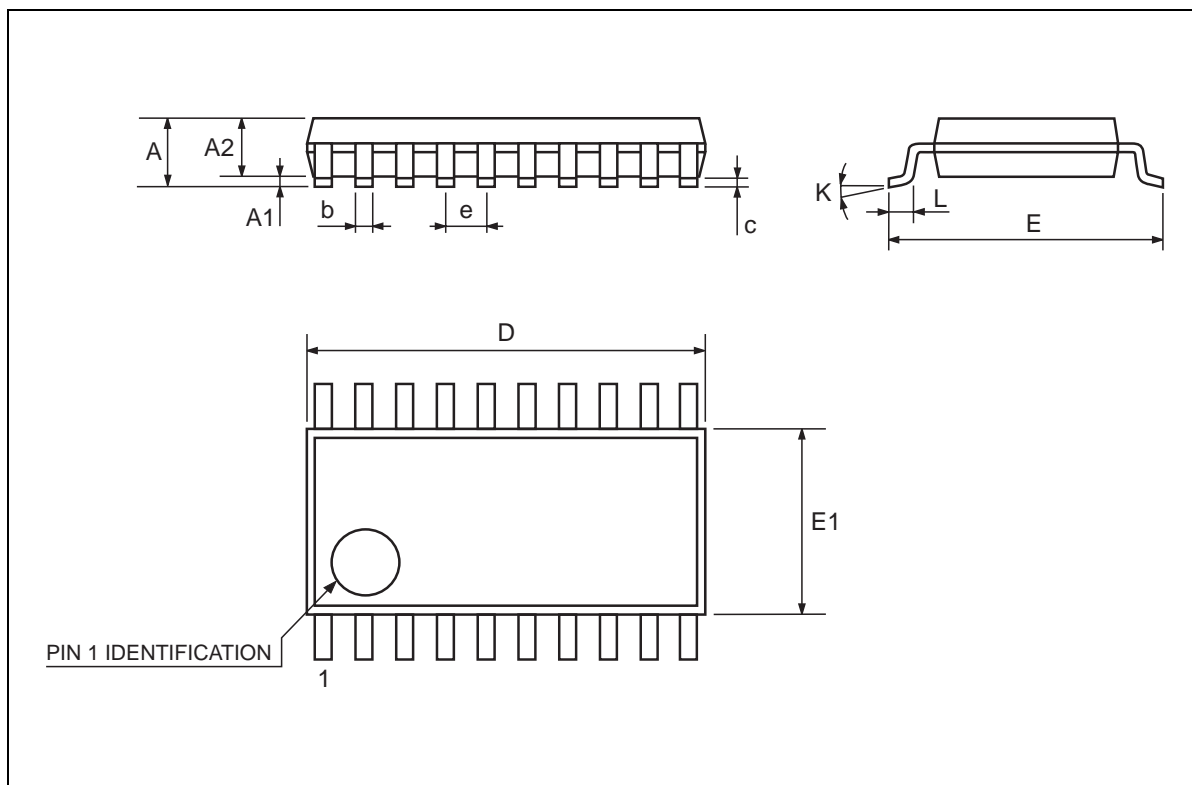
SO-20 MECHANICAL DATA

| 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.) | | | | | |



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° | 4° | 8° | 0° | 4° | 8° |
| L | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |



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