



ST3222

3 TO 3.6V, LOW POWER, UP TO 400KBPS, RS-232 DRIVERS AND RECEIVERS

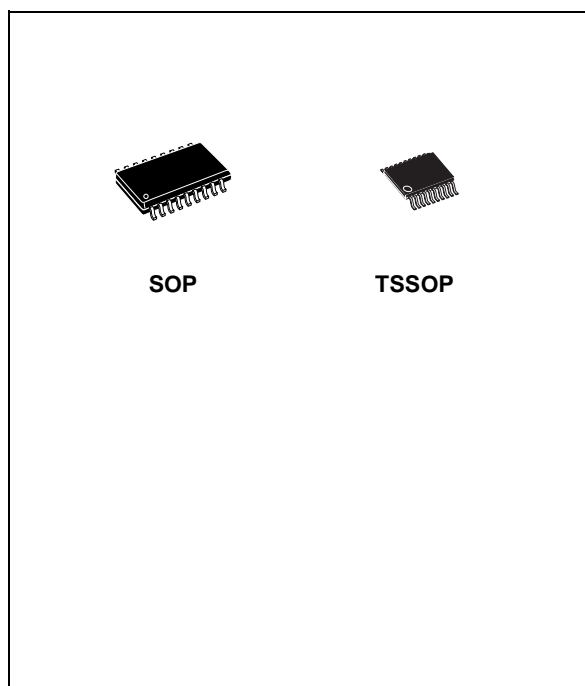
- 300 μ A SUPPLY CURRENT
- 250Kbps MINIMUM GUARENTEED DATA RATE
- 6V/ μ s MINIMUM GUARANTEED SLEW RATE
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- AVAILABLE IN SO-18 AND TSSOP20

DESCRIPTION

The ST3222 is a 3V powered EIA/TIA-232 and V.28/V.24 communications interface with low power requirements and high data-rate capabilities. ST3222 has a proprietary low dropout transmitter output stage providing true RS-232 performance from 3 to 3.6V power supplies. The device requires only four small 0.1 μ F standard external capacitors for operating from 3V supply.

The ST3222 has two receivers and two drivers. The ST3222 features a 1 μ A shutdown mode that reduces power consumption and extends battery life in portable systems. Its receivers can remain active in shutdown mode, allowing external devices such as modems to be monitored using only 1 μ A supply current.

The device is guaranteed to run at data rates of 250Kbps while maintaining RS-232 output levels.

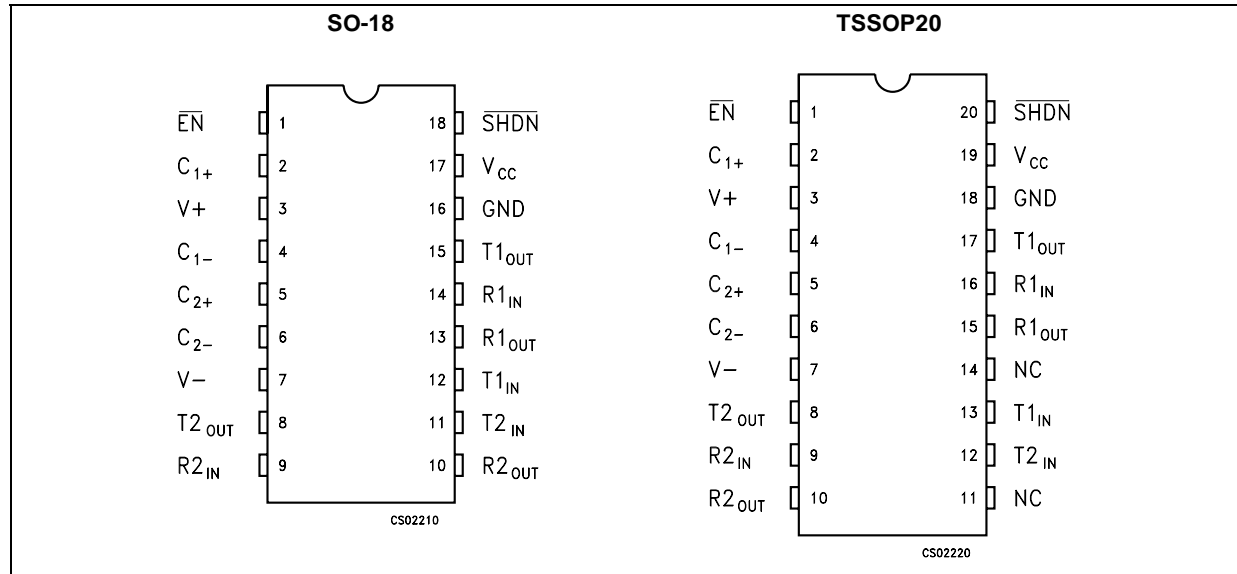


Typical applications are Notebook, Subnotebook and Palmtop Computers, Battery Powered Equipment, Hand-Held Equipment, Peripherals and Printers.

ORDERING CODES

| Type | Temperature Range | Package | Comments |
|-----------|-------------------|-----------------------|-----------------------------------|
| ST3222CD | 0 to 70 °C | SO-18 (Tube) | 50parts per tube / 20tube per box |
| ST3222BD | -40 to 85 °C | SO-18 (Tube) | 50parts per tube / 20tube per box |
| ST3222CDR | 0 to 70 °C | SO-18 (Tape & Reel) | 1000 parts per reel |
| ST3222BDR | -40 to 85 °C | SO-18 (Tape & Reel) | 1000 parts per reel |
| ST3222CTR | 0 to 70 °C | TSSOP20 (Tape & Reel) | 2500 parts per reel |
| ST3222BTR | -40 to 85 °C | TSSOP20 (Tape & Reel) | 2500 parts per reel |

PIN CONFIGURATION



PIN DESCRIPTION

| PIN N° (SO-18) | PIN N° (TSSOP20) | SYMBOL | NAME AND FUNCTION |
|----------------|------------------|-------------------|---|
| 1 | 1 | EN | Receiver Enable Control. Drive low for normal operation. Drive high to force the receivers outputs (R_OUT) into a high-impedance state. |
| 2 | 2 | C ₁₊ | Positive Terminal for the first Charge Pump Capacitor |
| 3 | 3 | V+ | 5.5V Generated By The Charge Pump. |
| 4 | 4 | C ₁₋ | Negative Terminal for the first Charge Pump Capacitor |
| 5 | 5 | C ₂₊ | Positive Terminal for the second Charge Pump Capacitor |
| 6 | 6 | C ₂₋ | Negative Terminal for the second Charge Pump Capacitor |
| 7 | 7 | V- | -5.5V Generated By The Charge Pump. |
| 8 | 8 | T2 _{OUT} | Second Transmitter Output Voltage |
| 9 | 9 | R2 _{IN} | Second Receiver Input Voltage |
| 10 | 10 | R2 _{OUT} | Second Receiver Output Voltage |
| | 11 | NC | Not Connected |
| 11 | 12 | T2 _{IN} | Second Transmitter Input Voltage |
| 12 | 13 | T1 _{IN} | First Transmitter Input Voltage |
| | 14 | NC | Not Connected |
| 13 | 15 | R1 _{OUT} | First Receiver Output Voltage |
| 14 | 16 | R1 _{IN} | First Receiver Input Voltage |
| 15 | 17 | T1 _{OUT} | First Transmitter Output Voltage |
| 16 | 18 | GND | Ground |
| 17 | 19 | V _{CC} | Supply Voltage |
| 18 | 20 | SHDN | Active Low Shutdown Control Input. Drive Low To Shut-down Transmitters And Charge Pump |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|--------------------|--------------------------------------|---------------------------------|------|
| V _{CC} | Supply Voltage | -0.3 to 6 | V |
| V+ | Doubled Voltage Terminal | (V _{CC} - 0.3) to 7 | V |
| V- | Inverted Voltage Terminal | 0.3 to -7 | V |
| V+ + V- | | 13 | V |
| T _{IN} | Transmitter Input Voltage Range | -0.3 to 6 | V |
| SHDN | Transmitter Input Voltage Range | -0.3 to 6 | V |
| R _{IN} | Receiver Input Voltage Range | ± 25 | V |
| T _{OUT} | Transmitter Output Voltage Range | ± 13.2 | V |
| R _{OUT} | Receiver Output Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| t _{SHORT} | Transmitter Output Short to GND Time | Continuous | |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied. V+ and V- can have a maximum magnitude of +7V, but their absolute addition can not exceed 13 V.

ELECTRICAL CHARACTERISTICS

(C₁ - C₄ = 0.1μF, V_{CC} = 3V to 3.6V, T_A = -40 to 85°C, unless otherwise specified.

Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--------------------------------------|--|------|------|------|------|
| I _{SUPPLY} | V _{CC} Power Supply Current | No Load V _{CC} = 3.3V T _A = 25°C SHDN=V _{CC} | | 0.3 | 1 | mA |
| I _{SHDN} | SHUTDOWN Supply Current | No Load V _{CC} = 3.3V T _A = 25°C SHDN=V _{CC} | | 1 | 10 | μA |

LOGIC INPUT ELECTRICAL CHARACTERISTICS

(C₁ - C₄ = 0.1μF, V_{CC} = 3V to 3.6V, T_A = -40 to 85°C, unless otherwise specified.

Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|------------------------------|-------------------------|------|--------|------|------|
| V _{IL} | Input Logic Threshold Low | T-IN, EN, SHDN (Note 1) | | | 0.8 | V |
| V _{IH} | Input Logic Threshold High | V _{CC} = 3.3V | 2 | | | V |
| V _{HYS} | Transmitter Input Histeresys | | | 0.5 | | V |
| I _{IL} | Input Leakage Current | T-IN, EN, SHDN | | ± 0.01 | ± 1 | μA |

Note 1: Transmitter input hysteresis is typically 250mV

TRANSMITTER ELECTRICAL CHARACTERISTICS

(C₁ - C₄ = 0.1μF V_{CC} = 3V to 3.6V, T_A = -40 to 85°C, unless otherwise specified.

Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------|-------------------------------|---|------|-------|------|------|
| V _{TOUT} | Output Voltage Swing | All Transmitter outputs are loaded with 3KΩ to GND | ± 5 | ± 5.4 | | V |
| R _{TOUT} | Transmitter Output Resistance | V _{CC} = V+ = V- = 0V V _{OUT} = ± 2V | 300 | 10M | | Ω |
| I _{TSC} | Output Short Circuit Current | | | | ± 60 | mA |
| I _{TOL} | Output Leakage Current | V _{CC} = 0V or 3V to 3.6V V _{OUT} = ± 12V Transmitters Disable | | | ± 25 | μA |

RECEIVER ELECTRICAL CHARACTERISTICS(C₁ - C₄ = 0.1μF V_{CC} = 3V to 3.6V, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

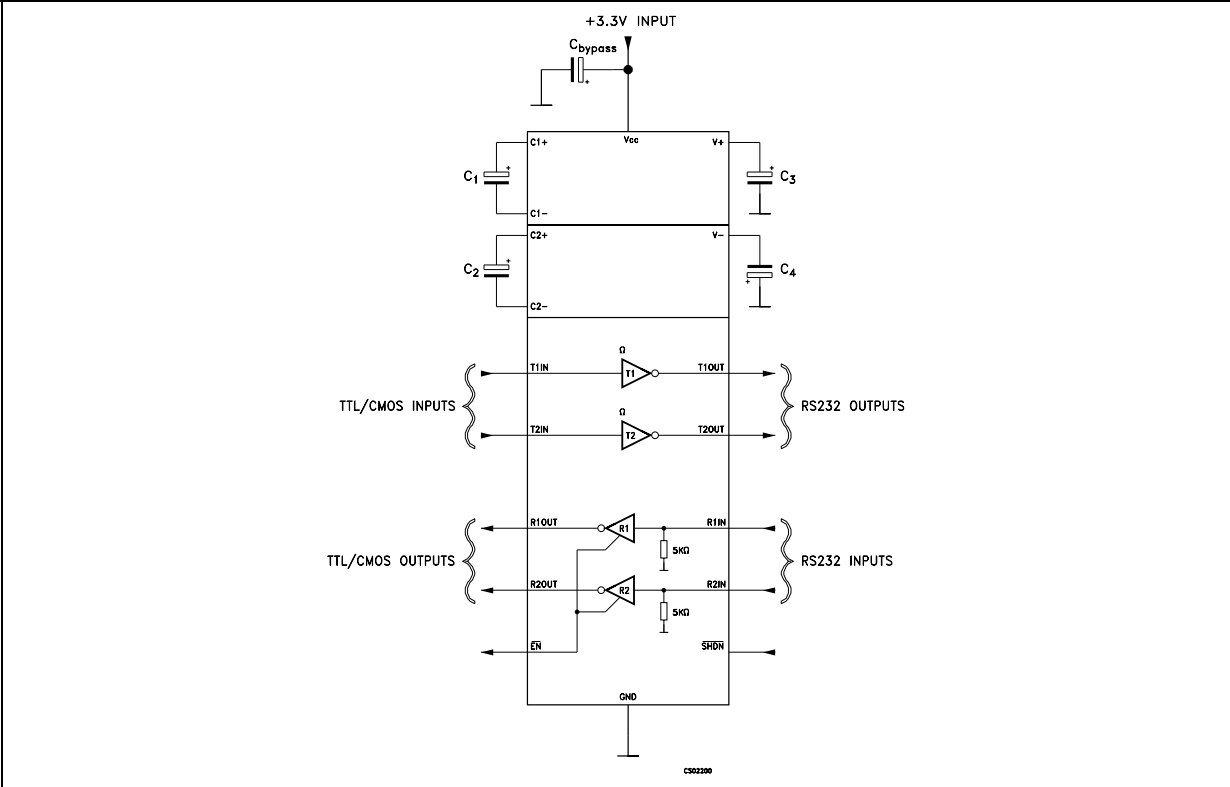
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|--|---|----------------------|----------------------|------|------|
| I _{OL} | Output Leakage Current | R-OUT, EN = V _{CC} , Receiver Disabled | | ± 0.05 | ± 10 | μA |
| V _{RIN} | Receiver Input Voltage Operating Range | | -25 | | 25 | V |
| V _{RIL} | Input Threshold Low | T _A = 25°C V _{CC} = 3.3V | 0.6 | 1.2 | | V |
| V _{RIH} | Input Threshold High | T _A = 25°C V _{CC} = 3.3V | | 1.5 | 2.4 | V |
| V _{RIHYS} | Input Hysteresis | | | 0.5 | | V |
| R _{RIN} | Input Resistance | T _A = 25°C | 3 | 5 | 7 | KΩ |
| V _{ROL} | TTL/CMOS Output Voltage Low | I _{OUT} = 1.6mA | | | 0.4 | V |
| V _{ROH} | TTL/CMOS Output Voltage High | I _{OUT} = -1mA | V _{CC} -0.6 | V _{CC} -0.1 | | V |

TIMING CHARACTERISTICS(C₁ - C₄ = 0.1μF, V_{CC} = 3V to 3.6V, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|--|--|--------|------|----------|--------------|
| D _R | Data Transfer Rate | R _L = 3KΩ C _{L2} = 1000pF one transmitter switching | 240 | 400 | | Kbps |
| t _{PHLR} t _{PLHR} | Propagation Delay Input to Output | R _{XIN} to R _{XOUT} C _L = 150pF | | 0.2 | | μs |
| t _{PHLT} - t _{THL} | Transmitter Propagation Delay Difference | (Note 1) | | 100 | | ns |
| t _{OER} | Receiver Output Enable Time | Normal Operation | | 200 | | ns |
| t _{ODR} | Receiver Output Disable Time | Normal Operation | | 200 | | ns |
| t _{PHLR} - t _{THR} | Receiver Propagation Delay Difference | | | 50 | | ns |
| S _{RT} | Trnasition Slew Rate | T _A = 25°C R _L = 3KΩ to 7KΩ V _{CC} = 3.3V measured from +3V to -3V or -3V to +3V C _L = 150pF to 1000pF C _L = 150pF to 2500pF | 6 4 | | 30 30 | V/μs V/μs |

Transmitter Skew is measured at the transmitter zero cross points

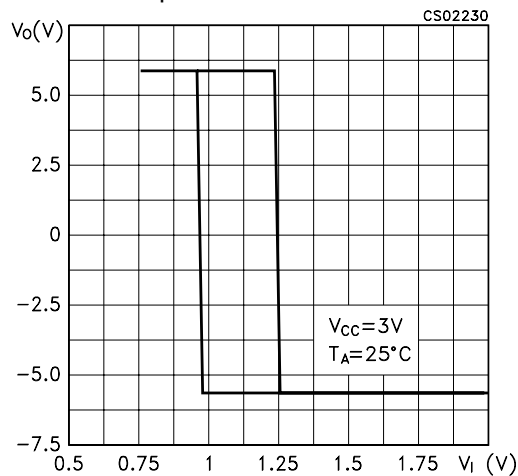
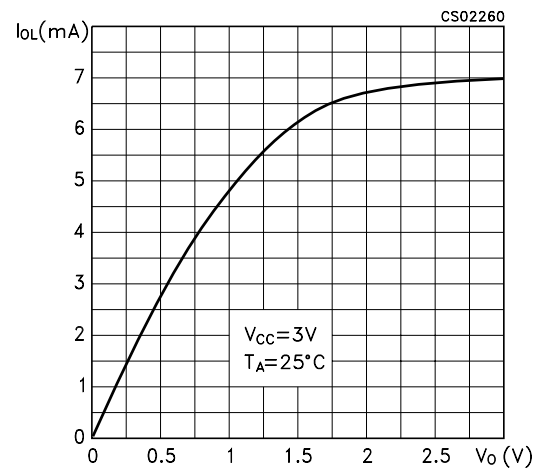
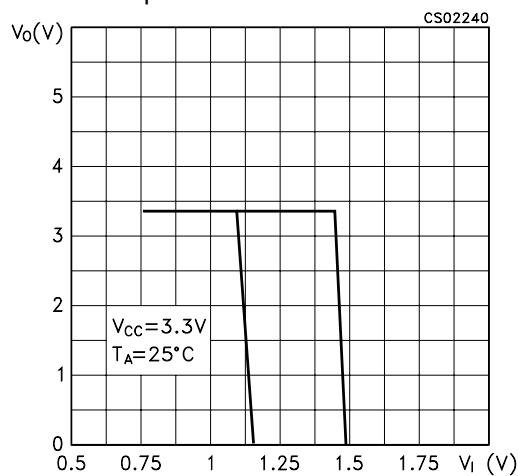
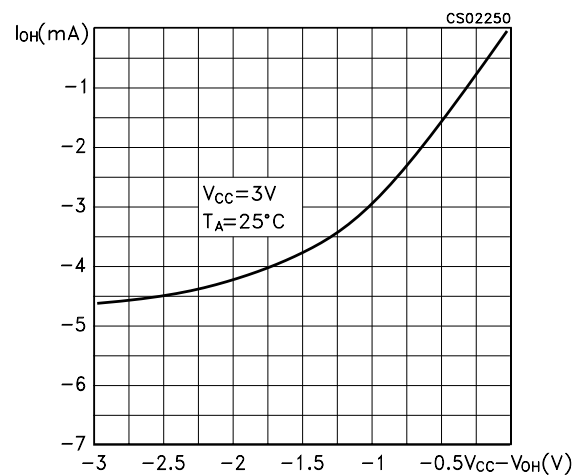
APPLICATION CIRCUITS



CAPACITANCE VALUE (μF)

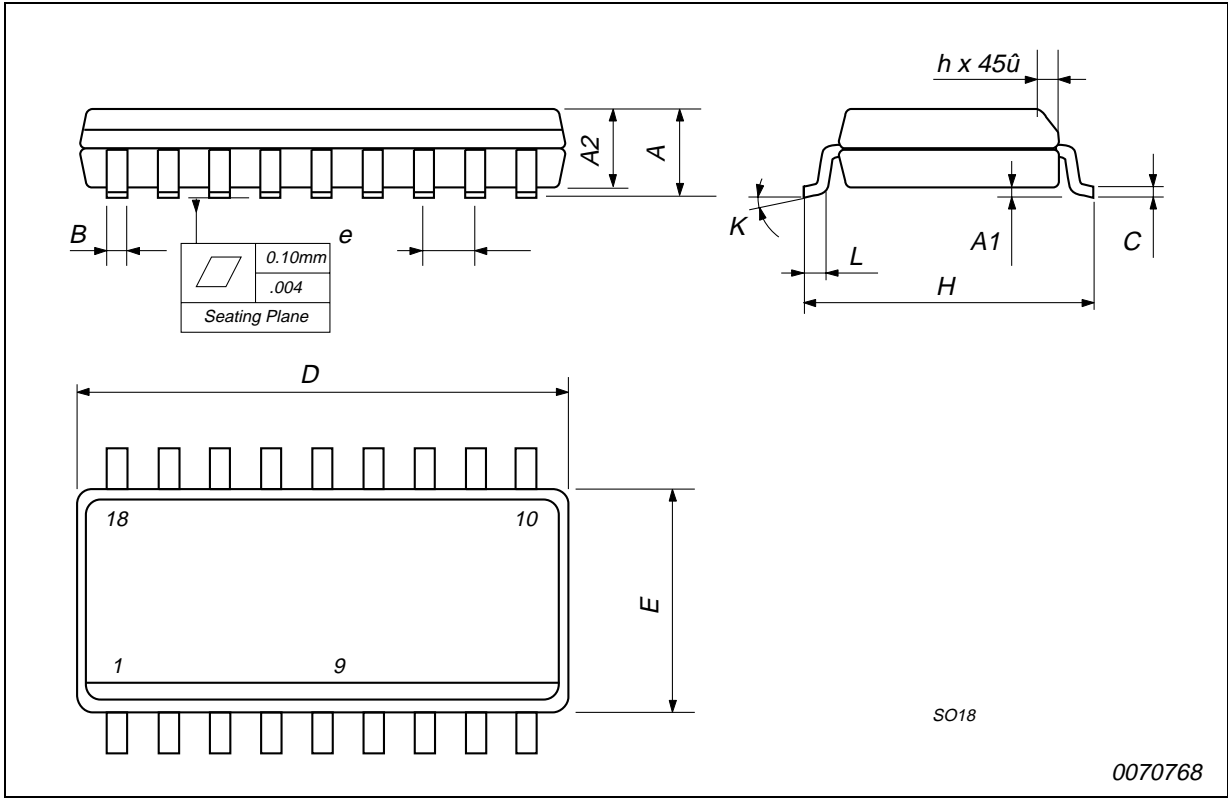
| C1 | C2. | C3 | C4 | Cbypass |
|-----|-----|-----|-----|---------|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified $T_j = 25^\circ\text{C}$)

Figure 1 : Driver Voltage Transfer Characteristics for Transmitter Inputs

Figure 3 : Output Current vs Output Low Voltage

Figure 2 : Driver Voltage Transfer Characteristics for Receiver Inputs

Figure 4 : Output Current vs Output High Voltage


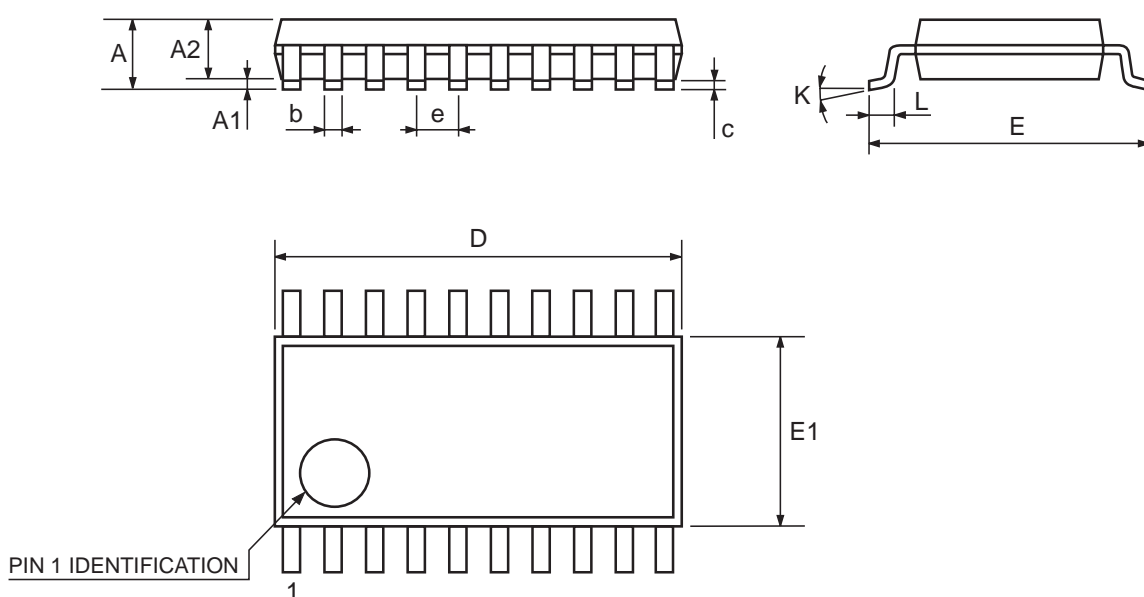
SO-18 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------------|------|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 2.35 | | 2.65 | 0.092 | | 0.104 |
| A1 | 0.1 | | 0.3 | 0.004 | | 0.012 |
| A2 | | | 2.55 | | | 0.100 |
| B | 0.33 | | 0.51 | 0.013 | | 0.020 |
| C | 0.23 | | 0.32 | 0.009 | | 0.012 |
| D | 11.35 | | 11.75 | 0.447 | | 0.462 |
| E | 7.4 | | 7.6 | 0.291 | | 0.299 |
| e | | 1.27 | | | 0.050 | |
| H | 10.00 | | 10.65 | 0.393 | | 0.419 |
| h | 0.25 | | 0.75 | 0.010 | | 0.029 |
| k | 8 ° (max.) | | | | | |
| L | 0.4 | | 1.27 | 0.016 | | 0.050 |



TSSOP20 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|----------|------|-------|------------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.2 | | | 0.047 |
| A1 | 0.05 | | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 0.8 | 1 | 1.05 | 0.031 | 0.039 | 0.041 |
| b | 0.19 | | 0.30 | 0.007 | | 0.012 |
| c | 0.09 | | 0.20 | 0.004 | | 0.0079 |
| D | 6.4 | 6.5 | 6.6 | 0.252 | 0.256 | 0.260 |
| E | 6.2 | 6.4 | 6.6 | 0.244 | 0.252 | 0.260 |
| E1 | 4.3 | 4.4 | 4.48 | 0.169 | 0.173 | 0.176 |
| e | | 0.65 BSC | | | 0.0256 BSC | |
| K | 0° | | 8° | 0° | | 8° |
| L | 0.45 | 0.60 | 0.75 | 0.018 | 0.024 | 0.030 |



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