



ST207E

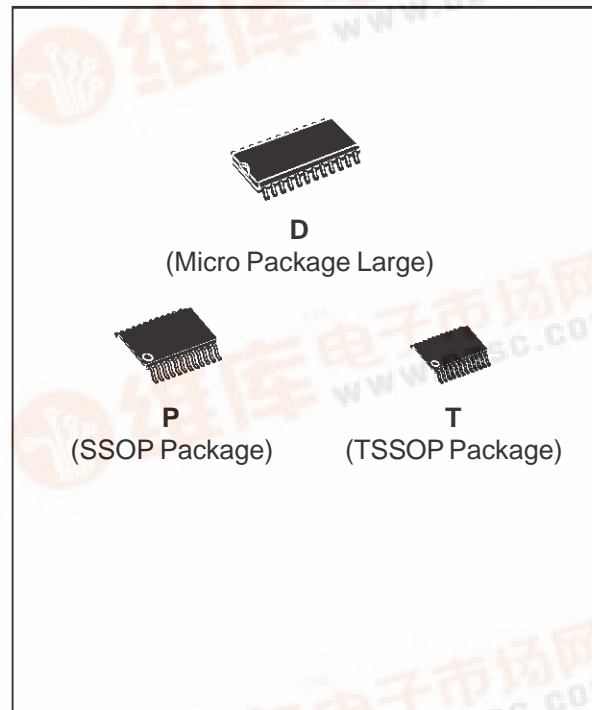
± 15KV ESD PROTECTED 5V RS-232 TRANSCEIVER

PRELIMINARY DATA

- ESD PROTECTION FOR RS-232 I/O PINS:
± 15 KV HUMAN BODY MODEL
- GUARANTEED 120kbps DATA RATE -
LapLink™ COMPATIBLE
- GUARANTEED SLEW RATE 3V/μs (Min)
- OPERATE FROM A SINGLE 5V POWER
SUPPLY
- PACKAGED IN SO-24, SSO-24 AND TSSOP24
PACKAGES

DESCRIPTION

The ST207E is a 5 driver and 3 receiver devices designed for RS-232 and V.28 communications in harsh environments. Each transmitter output and receiver input is protected against ±15KV electrostatic discharge (ESD) shocks. The drivers and receivers of the ST207E meet all EIA/TIA-232E and CCITT V.28 specifications at data rates up to 120Kbps, when loaded in accordance with the EIA/TIA-232E specification. The ST207E operates with four 0.1μF capacitors. It comes in 24-pin SO and TSSOP packages.

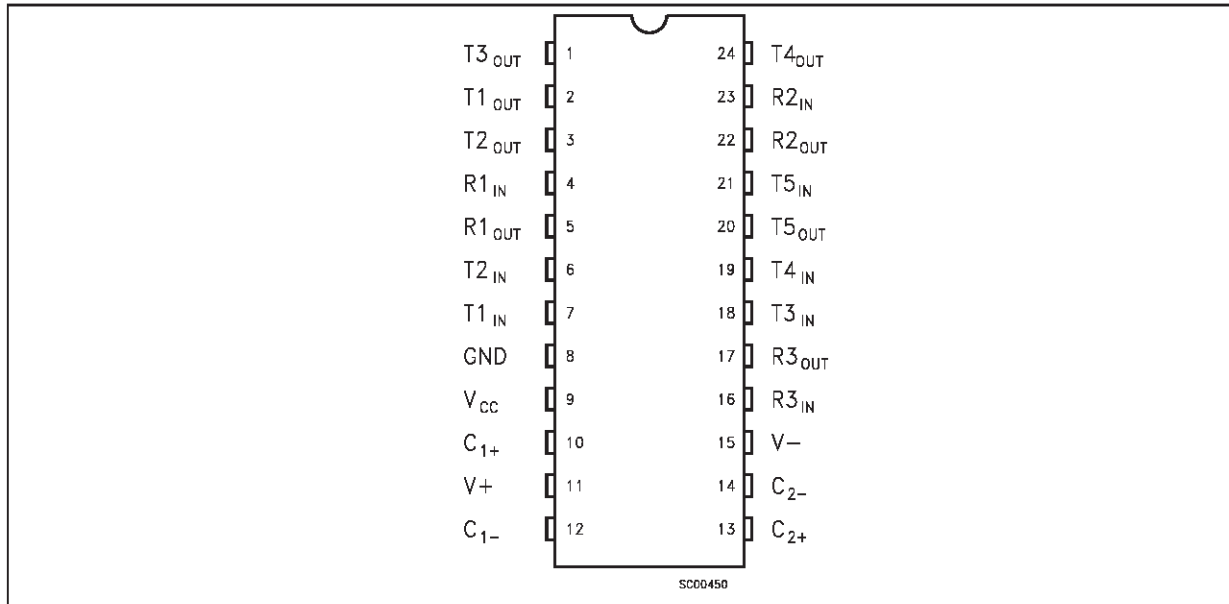


ORDER CODES

| Type | Temperature Range | Package | Comments |
|-----------|-------------------|-----------------------|-------------------------------------|
| ST207ECD | 0 to 70 °C | SO-24 (Tube) | 33 parts per tube / 25 tube per box |
| ST207EBD | -40 to 85 °C | SO-24 (Tube) | 33 parts per tube / 25 tube per box |
| ST207ECDR | 0 to 70 °C | SO-24 (Tape & Reel) | 1000 parts per reel |
| ST207EBDR | -40 to 85 °C | SO-24 (Tape & Reel) | 1000 parts per reel |
| ST207ECTR | 0 to 70 °C | TSSOP24 (Tape & Reel) | 2500 parts per reel |
| ST207EBTR | -40 to 85 °C | TSSOP24 (Tape & Reel) | 2500 parts per reel |
| ST207ECPR | 0 to 70 °C | SSOP24 (Tape & Reel) | |
| ST207EBPR | -40 to 85 °C | SSOP24 (Tape & Reel) | |

ST207E

PIN CONFIGURATION



PIN DESCRIPTION

| PIN No | SYMBOL | NAME AND FUNCTION |
|--------|-------------------|--|
| 1 | T3 _{OUT} | RS-232 Driver Output |
| 2 | T1 _{OUT} | RS-232 Driver Output |
| 3 | T2 _{OUT} | RS-232 Driver Output |
| 4 | R1 _{IN} | RS-232 Receiver Input |
| 5 | R1 _{OUT} | TTL/CMOS Receiver Outputs. All The Receivers Are Inactive In Sutdown |
| 6 | T2 _{IN} | TTL/CMOS Driver Inputs. Internal Pull-up to V _{CC} |
| 7 | T1 _{IN} | TTL/CMOS Driver Inputs. Internal Pull-up to V _{CC} |
| 8 | GND | Ground |
| 9 | V _{CC} | 4.75V to 5.25V Supply Voltage |
| 10 | C1+ | Terminal For Positive Charge-pump Capacitor |
| 11 | V+ | 2V _{CC} Generated By The Charge Pump |
| 12 | C1- | Terminal For Positive Charge-pump Capacitor |
| 13 | C2+ | Terminal For Negative Charge-pump Capacitor |
| 14 | C2- | Terminal For Negative Charge-pump Capacitor |
| 15 | V- | -2V _{CC} Generated By The Charge Pump |
| 16 | R3 _{IN} | RS-232 Receiver Input |
| 17 | R3 _{OUT} | TTL/CMOS Receiver Outputs. All The Receivers Are Inactive In Sutdown |
| 18 | T3 _{IN} | TTL/CMOS Driver Inputs. Internal Pull-up to V _{CC} |
| 19 | T4 _{IN} | TTL/CMOS Driver Inputs. Internal Pull-up to V _{CC} |
| 20 | T5 _{OUT} | RS-232 Driver Output |
| 21 | T5 _{IN} | TTL/CMOS Driver Inputs. Internal Pull-up to V _{CC} |
| 22 | R2 _{OUT} | TTL/CMOS Receiver Outputs. All The Receivers Are Inactive In Sutdown |
| 23 | R2 _{IN} | RS-232 Receiver Input |

ABSOLUTE MAXIMUM RATINGS (Note 1)

| Symbol | Parameter | Value | Unit |
|---------------------|--|--|------|
| V _{CC} | Supply Voltage | -0.3 to 6 | V |
| V ₊ | Extra Positive Voltage | (V _{CC} - 0.3) to 14 | V |
| V ₋ | Extra Negative Voltage | -14 to 0.3 | V |
| T _{IN} | Transmitter Input Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| R _{IN} | Receiver Input Voltage Range | ±30 | V |
| T _{OUT} | Transmitter Output Voltage Range | (V ₋ - 0.3) to (V ₊ + 0.3) | V |
| R _{OUT} | Receiver Output Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| T _{SCTOUT} | Short Circuit Duration on T _{OUT} | Continuous | |
| T _{stg} | Storage Temperature Range | -65 to +150 | °C |

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

ESD PERFORMANCE: TRANSMITTER OUTPUTS, RECEIVER INPUTS

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|--------|------------------------|------------------|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| ESD | ESD Protection Voltage | Human Body Model | | ±15 | | kV |

ELECTRICAL CHARACTERISTICS (C₁ -C₄ = 0.1μF, V_{CC} = 5V ± 5% T_A = Min to Max, unless otherwise specified. Typical Valus are referred to T_A = 25 °C)

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|---------------------|--------------------------------------|---------------------------------|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| I _{SUPPLY} | V _{CC} Power Supply Current | No Load, T _A = 25 °C | | 2 | 5 | mA |

RECEIVER ELECTRICAL CHARACTERISTICS (C₁ -C₄ = 0.1μF, V_{CC} = 5V ± 5% T_A = Min to Max, unless otherwise specified. Typical Valus are referred to T_A = 25 °C)

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|--------------------|--|--|-------|----------------------|------|------|
| | | | Min. | Typ. | Max. | |
| V _{RIN} | Receiver Input Voltage Operating Range | | -30 | | 30 | V |
| V _{RIL} | Input Threshold Low | T _A = 25 °C, V _{CC} = 5 V | 0.8 | 1.2 | | V |
| V _{RIH} | Input Threshold High | T _A = 25 °C, V _{CC} = 5 V | | 1.7 | 2.4 | V |
| V _{RIHYS} | Input Hysteresis | V _{CC} = 5 V, no hysteresis in shutdown | 0.2 | 0.5 | 1 | V |
| R _{RIN} | Input Resistance | T _A = 25 °C, V _{CC} = 5 V | 3 | 5 | 7 | KΩ |
| V _{OL} | Output Voltage Low | | | | 0.4 | V |
| V _{OH} | Output Voltage High | I _{OUT} = -1mA | 3.5 | V _{CC} -0.4 | | V |

ST207E

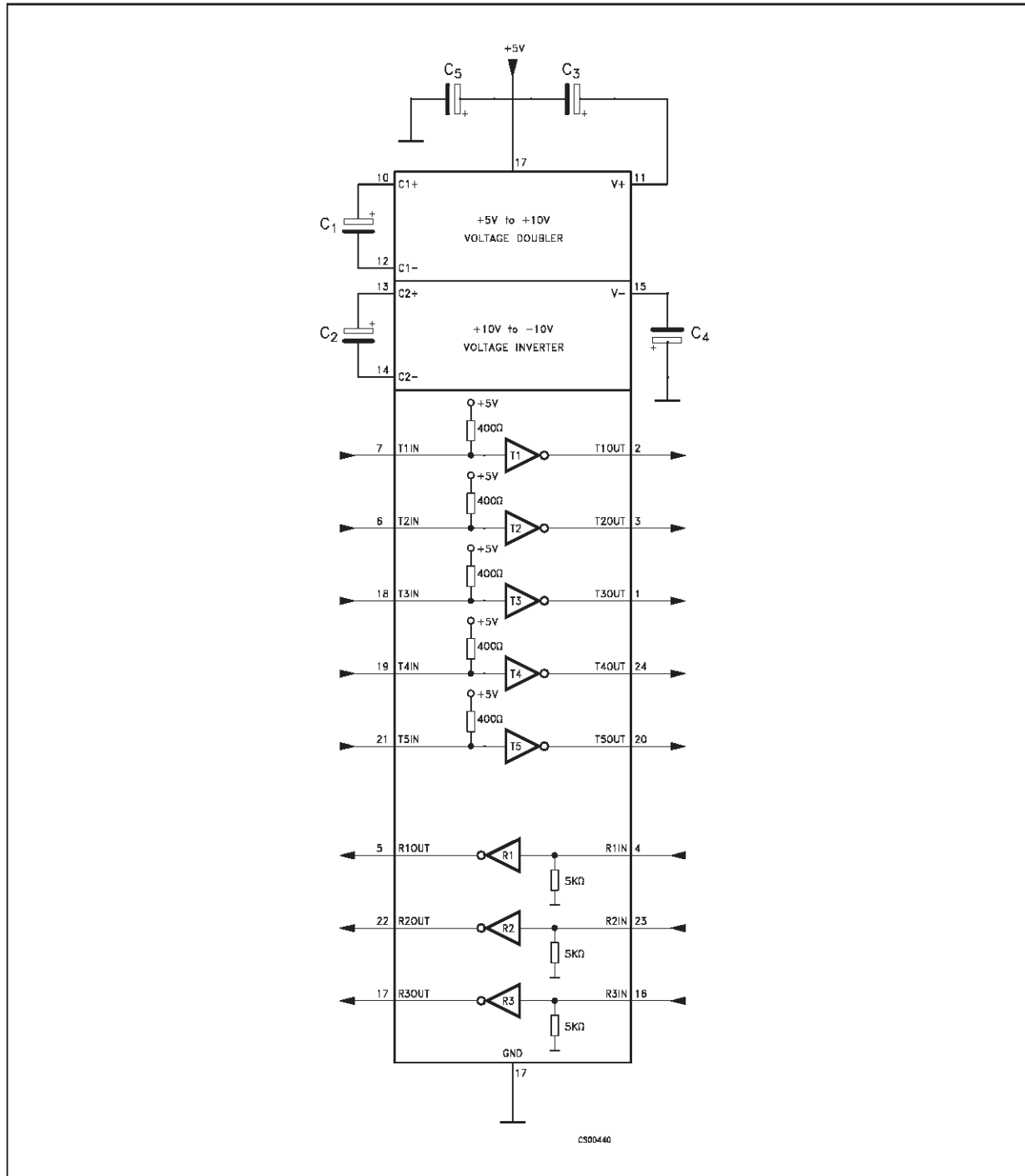
TRANSMITTER ELECTRICAL CHARACTERISTICS ($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5\text{V} \pm 5\%$ $T_A = \text{Min to Max}$, unless otherwise specified. Typical Valus are referred to $T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|------------|--|--|---------|-----------|----------|---------------|
| | | | Min. | Typ. | Max. | |
| V_{TOUT} | Output Voltage Swing | All drivers loaded with $3\text{K}\Omega$ to GND | ± 5 | ± 8.5 | | V |
| R_{OUT} | Transmitter Output Resistance | $V_{CC} = V_+ = V_- = 0\text{V}$ $V_{OUT} = \pm 2\text{V}$ | 300 | | | Ω |
| I_{SC} | Transmitter Output Short Circuit Current | | | ± 18 | ± 60 | mA |
| I_{IL} | Input Pull-Up Current | $T_{IN} = 0\text{V}$ | | 15 | 200 | μA |
| V_{TIL} | Input Logic Threshold Low | | | | 0.8 | V |
| V_{TIH} | Input Logic Threshold High | | 2 | | | V |

TIMING CHARACTERISTICS ($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5\text{V} \pm 5\%$ $T_A = \text{Min to Max}$, unless otherwise specified. Typical Valus are referred to $T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|--------------------------|-------------------------------|--|-------|------|------|------------------------|
| | | | Min. | Typ. | Max. | |
| DR | Maximum Data Rate | $R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$, $C_L = 50\text{pF}$ to 1000pF one transmitter switching | 120 | | | kbps |
| t_{PLHR} t_{PHLR} | Receiver Propagation Delay | All drivers loaded with $3\text{K}\Omega$ to GND | | 0.2 | 10 | μs |
| t_{PLHT} t_{PHLT} | Transmitter Propagation Delay | $R_L = 3\text{K}\Omega$, $C_L = 2500\text{pF}$ all transmitters loaded | | 2 | | μs |
| SR | Transition-Region Slew Rate | $T_A = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $R_L = 3\text{K}\Omega$ to $7\text{K}\Omega$, $C_L = 50\text{pF}$ to 1000pF measure from -3V to 3V or 3V to -3V | 3 | 7 | 30 | $\text{V}/\mu\text{s}$ |

APPLICATION CIRCUITS (note 1, note 2)



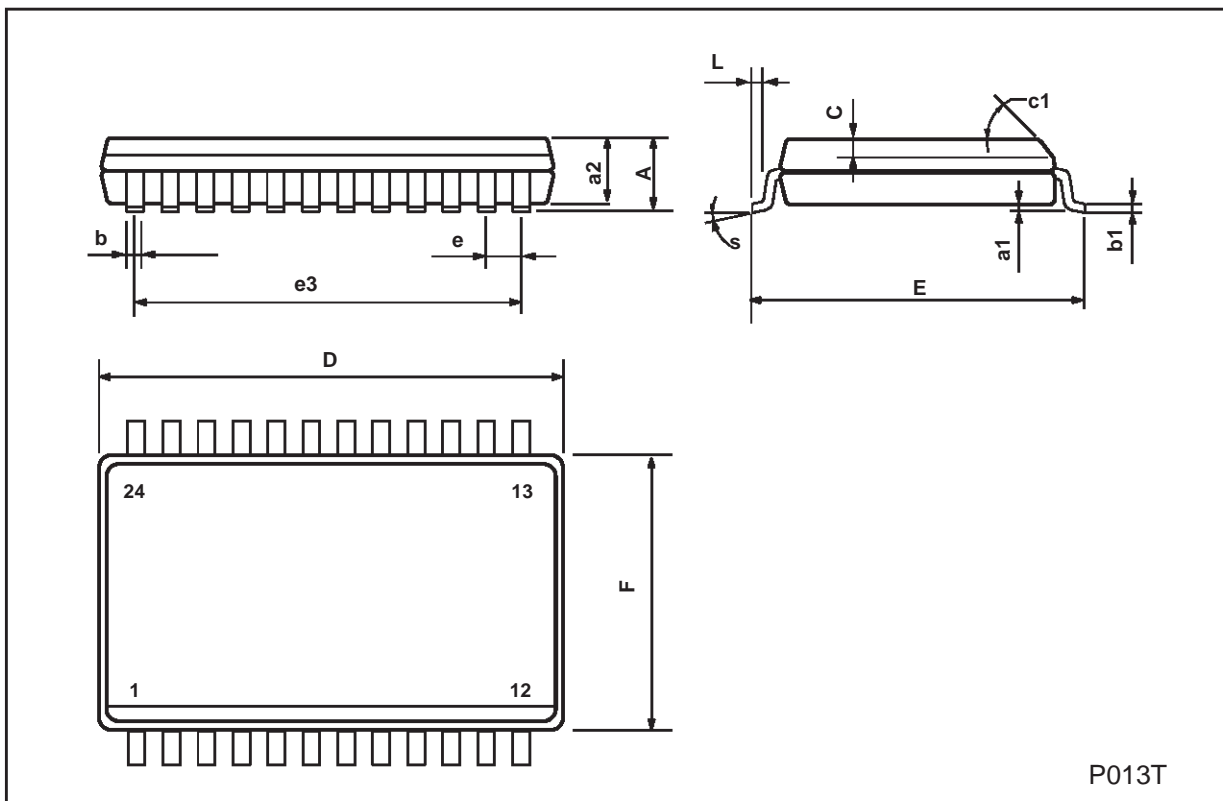
Note 1: C1-4 capacitors can even be 1 μF ones.
 Note 2: C1-4 can be common or biased capacitors.

Capacitance Value (μF)

| DEVICES | C1 | C2 | C3 | C4 | C5 |
|---------|-----|-----|-----|-----|-----|
| ST207E | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

SO-24 MECHANICAL DATA

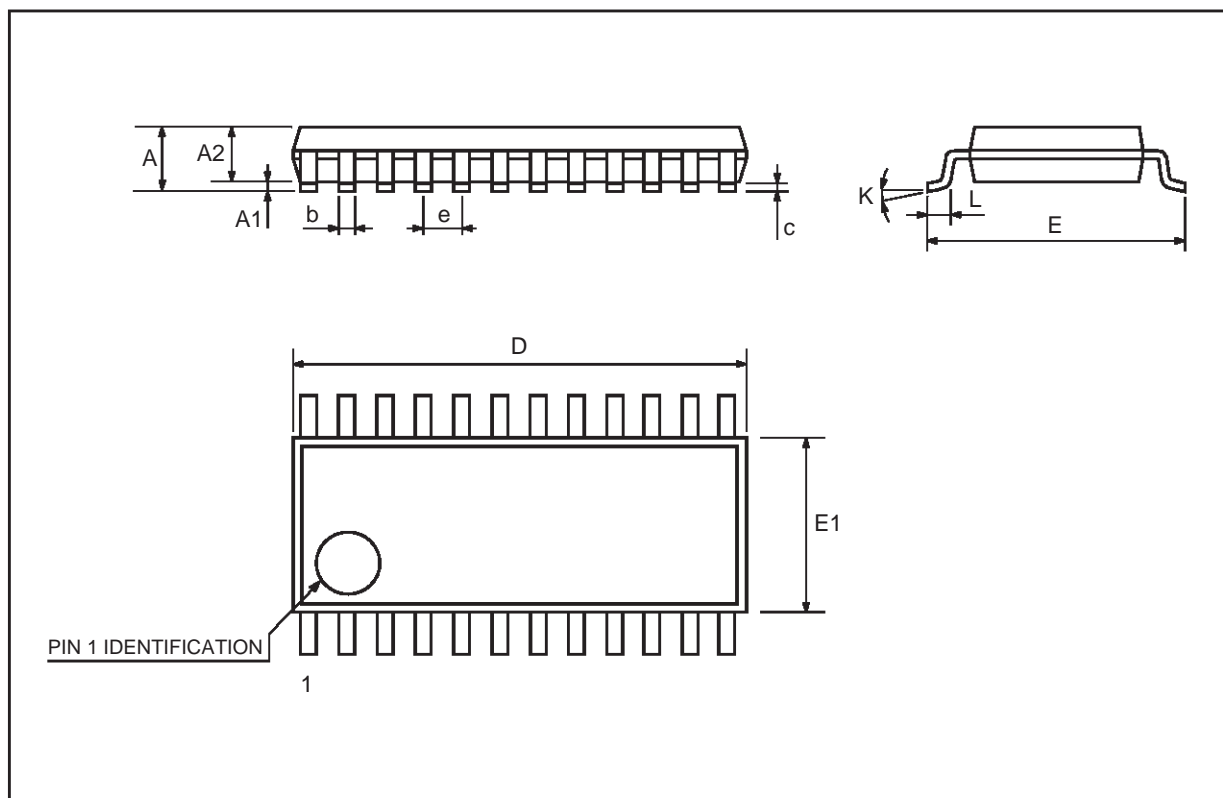
| DIM. | mm | | | inch | | |
|------|-----------|-------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.10 | | 0.20 | 0.004 | | 0.007 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.013 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.012 |
| C | | 0.50 | | | 0.020 | |
| c1 | 45 (typ.) | | | | | |
| D | 15.20 | | 15.60 | 0.598 | | 0.614 |
| E | 10.00 | | 10.65 | 0.393 | | 0.420 |
| e | | 1.27 | | | 0.05 | |
| e3 | | 13.97 | | | 0.55 | |
| F | 7.40 | | 7.60 | 0.291 | | 0.299 |
| L | 0.50 | | 1.27 | 0.19 | | 0.050 |
| S | 8 (max.) | | | | | |



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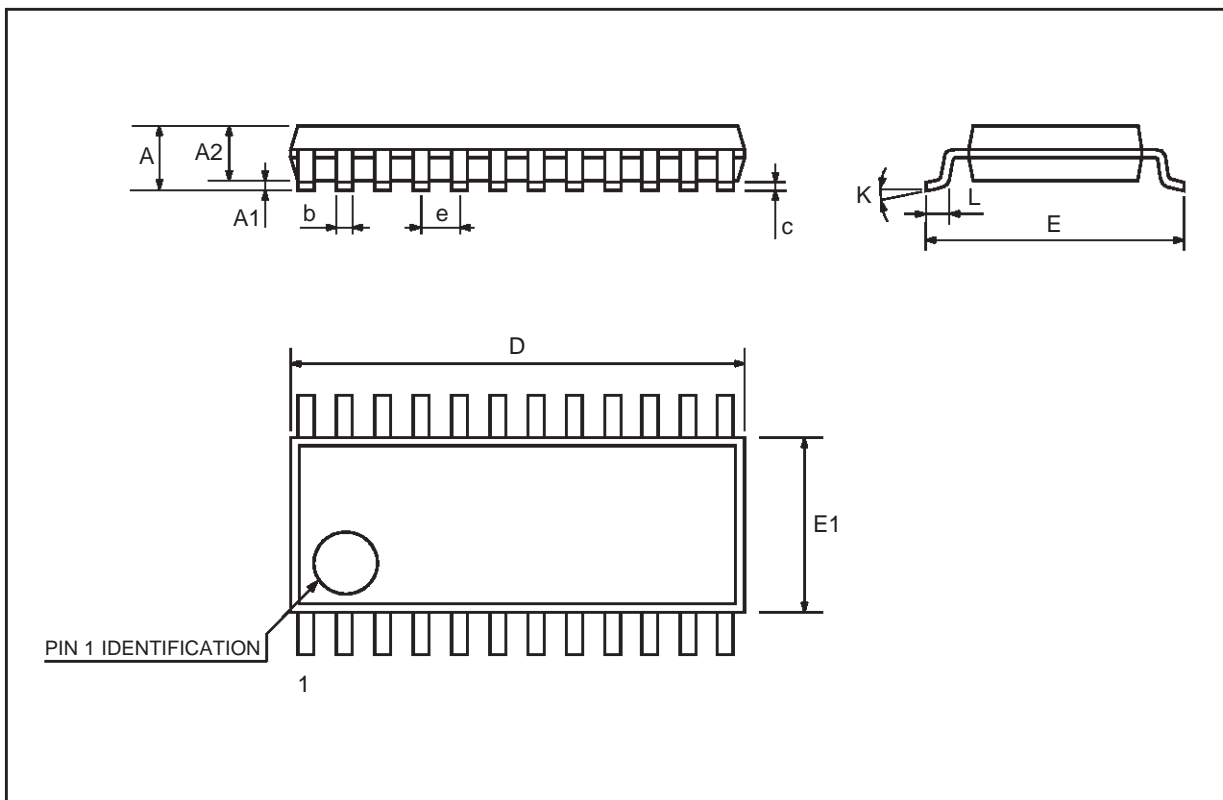
SSOP24 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|----------|------|-------|------------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.00 | | | 0.079 |
| A1 | | | 0.25 | | | 0.010 |
| A2 | 1.51 | | 2.00 | 0.059 | | 0.079 |
| b | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| c | 0.10 | | 0.35 | 0.004 | | 0.014 |
| D | 8.35 | | 9.35 | 0.329 | | 0.368 |
| E | 7.6 | | 8.7 | 0.299 | | 0.343 |
| E1 | 5.02 | 6.10 | 6.22 | 0.198 | 0.240 | 0.245 |
| e | | 0.65 BSC | | | 0.0256 BSC | |
| K | 0° | | 10° | 0° | | 10° |
| L | 0.25 | 0.50 | 0.80 | 0.010 | 0.020 | 0.031 |



TSSOP24 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 | 7.7 | 7.8 | 7.9 | 0.303 | 0.307 | 0.311 |
| 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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