



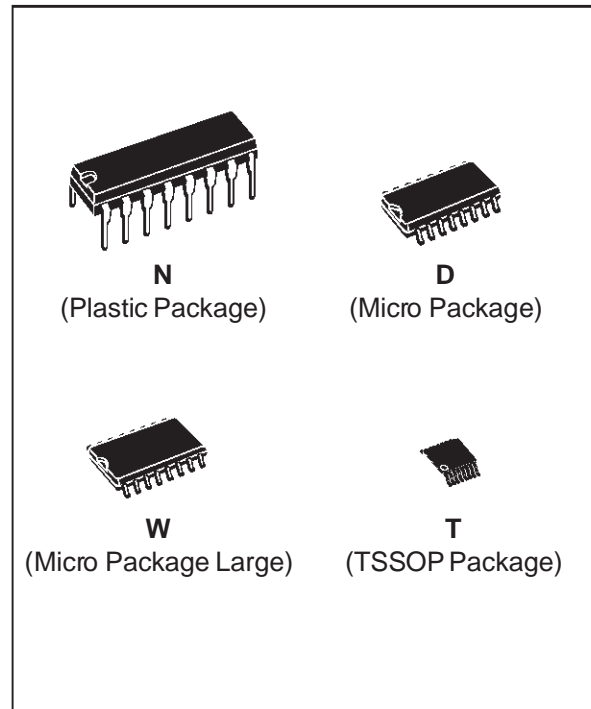
ST232A

VERY HIGH SPEED, ULTRA LOW POWER CONSUMPTION 5V POWERED RS-232 DRIVERS AND RECEIVERS

- SUPPLY VOLTAGE RANGE: 4.5 TO 5.5V
- SUPPLY CURRENT NO LOAD (TYP): 1.5mA
- TRANSMITTER OUTPUT VOLTAGE SWING (TYP): $\pm 9V$
- TRANSITION SLEW RATE (TYP.): $12V/\mu s$
- RECEIVER PROPAGATION DELAY (TYP.): $0.1\mu s$
- RECEIVER INPUT VOLTAGE RANGE: $\pm 30V$
- DATA RATE (TYP): 400Kbp/s
- OPERATING TEMPERATURE RANGE:
-40 TO 85 °C, 0 TO 70 °C

DESCRIPTION

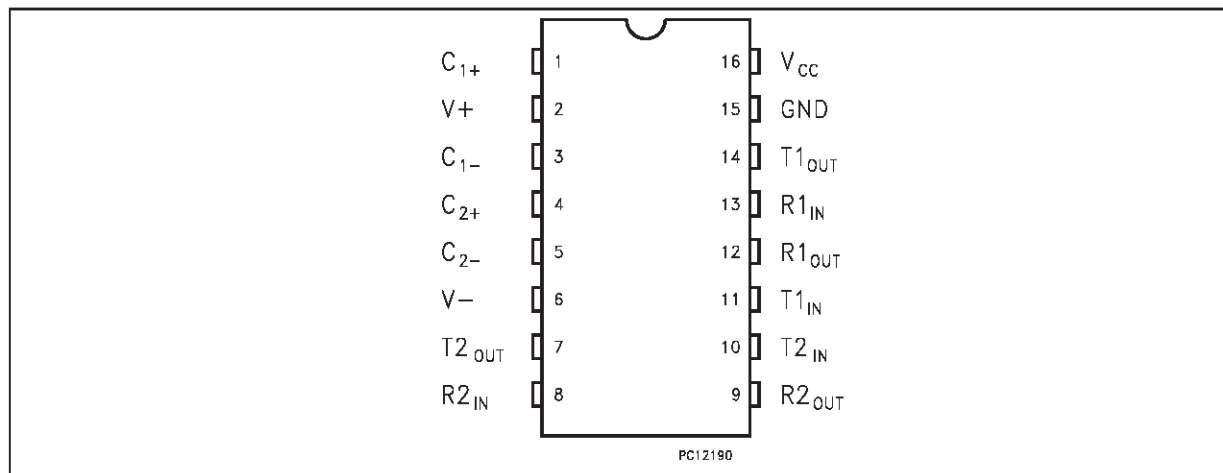
The ST232A is a 2 driver, 2 receiver device following EIA/TIA-232 and V.28 communication standard. It is particularly suitable for applications where $\pm 12V$ is not available. The ST232 uses a single 5V power supply and only four external capacitors ($0.1\mu F$). Typical applications are in: Portable Computers, Low Power Modems, Interfaces Translation, Battery Powered RS-232 System, Multi-Drop RS-232 Networks.



ORDER CODES

| Type | Temperature Range | Package | Comments |
|-----------|-------------------|---------------------------|-------------------------------------|
| ST232ACN | 0 to 70 °C | DIP-16 | 25 parts per tube / 40 tube per box |
| ST232ABN | -40 to 85 °C | DIP-16 | 25 parts per tube / 40 tube per box |
| ST232ACD | 0 to 70 °C | SO-16 (Tube) | 50 parts per tube / 20 tube per box |
| ST232ABD | -40 to 85 °C | SO-16 (Tube) | 50 parts per tube / 20 tube per box |
| ST232ACDR | 0 to 70 °C | SO-16 (Tape & Reel) | 2500 parts per reel |
| ST232ABDR | -40 to 85 °C | SO-16 (Tape & Reel) | 2500 parts per reel |
| ST232ACW | 0 to 70 °C | SO-16 Large (Tube) | 50 parts per tube / 20 tube per box |
| ST232ABW | -40 to 85 °C | SO-16 Large (Tube) | 50 parts per tube / 20 tube per box |
| ST232ACWR | 0 to 70 °C | SO-16 Large (Tape & Reel) | 1000 parts per reel |
| ST232ABWR | -40 to 85 °C | SO-16 Large (Tape & Reel) | 1000 parts per reel |
| ST232ACTR | 0 to 70 °C | TSSOP16 (Tape & Reel) | 2500 parts per reel |
| ST232ABTR | -40 to 85 °C | TSSOP16 (Tape & Reel) | 2500 parts per reel |

PIN CONFIGURATION



PIN DESCRIPTION

| PIN No | SYMBOL | NAME AND FUNCTION |
|--------|-------------------|--|
| 1 | C ₁₊ | Positive Terminal for the first Charge Pump Capacitor |
| 2 | V+ | Doubled Voltage Terminal |
| 3 | C ₁₋ | Negative Terminal for the first Charge Pump Capacitor |
| 4 | C ₂₊ | Positive Terminal for the second Charge Pump Capacitor |
| 5 | C ₂₋ | Negative Terminal for the second Charge Pump Capacitor |
| 6 | V- | Inverted Voltage Terminal |
| 7 | T _{2OUT} | Second Transmitter Output Voltage |
| 8 | R _{2IN} | Second Receiver Input Voltage |
| 9 | R _{2OUT} | Second Receiver Output Voltage |
| 10 | T _{2IN} | Second Transmitter Input Voltage |
| 11 | T _{1IN} | First Transmitter Input Voltage |
| 12 | R _{1OUT} | First Receiver Output Voltage |
| 13 | R _{1IN} | First Receiver Input Voltage |
| 14 | T _{1OUT} | First Transmitter Output Voltage |
| 15 | GND | Ground |
| 16 | V _{CC} | Supply Voltage |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|---------------------------------|------|
| V _{CC} | Supply Voltage | -0.3 to 6 | V |
| V+ | Extra Positive Voltage | (V _{CC} -0.3) to 13.2 | V |
| V- | Extra Negative Voltage | 0.3 to -13.2 | 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 | ±15 | V |
| R _{OUT} | Receiver Output Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| T _{SCTOUT} | Short Circuit Duration on T _{OUT} | infinite | |

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

ELECTRICAL CHARACTERISTICS(C₁ -C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85 °C, unless otherwise specified.Typical Values 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 | | 1.5 | 4 | mA |

TRANSMITTER ELECTRICAL CHARACTERISTICS(C₁ -C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85 °C, unless otherwise specified.Typical Values are referred to T_A = 25 °C)

| Symbol | Parameter | Test Conditions | Value | | | Unit |
|-------------------|--|--|-------|------|------|---------|
| | | | Min. | Typ. | Max. | |
| V _{TOUT} | Output Voltage Swing | All Transmitter outputs are loaded with 3KΩ to GND | ±5 | ±9 | | V |
| I _{TIL} | Logic Pull-Up Current | T _{IN} = 0 V | | 5 | 40 | μA |
| V _{TIL} | Input Logic Threshold Low | | 0.8 | 1.4 | | V |
| V _{TIH} | Input Logic Threshold High | | | 1.4 | 2 | V |
| SR _T | Transition Slew Rate | T _A = 25 °C, V _{CC} = 5 V, R _L = 3 to 7 KΩ, C _L = 50 to 2500 pF (Note 1) | 6 | 12 | 30 | V/μs |
| D _R | Data Rate | (Note 2) | 200 | 400 | | Kbits/s |
| R _{TOUT} | Transmitter Output Resistance | V _{CC} = V ₊ = V ₋ = 0V V _{OUT} = ± 2 V | 300 | 10M | | Ω |
| I _{SC} | Transmitter Output Short Circuit Current | one T _{XOUT} to GND | ±7 | ±22 | | mA |
| t _{dT} | Propagation Delay Time | TTL-CMOS IN to RS-232 OUT C _L = 150 pF (50% to 50%) | | 1.3 | 3.5 | μs |

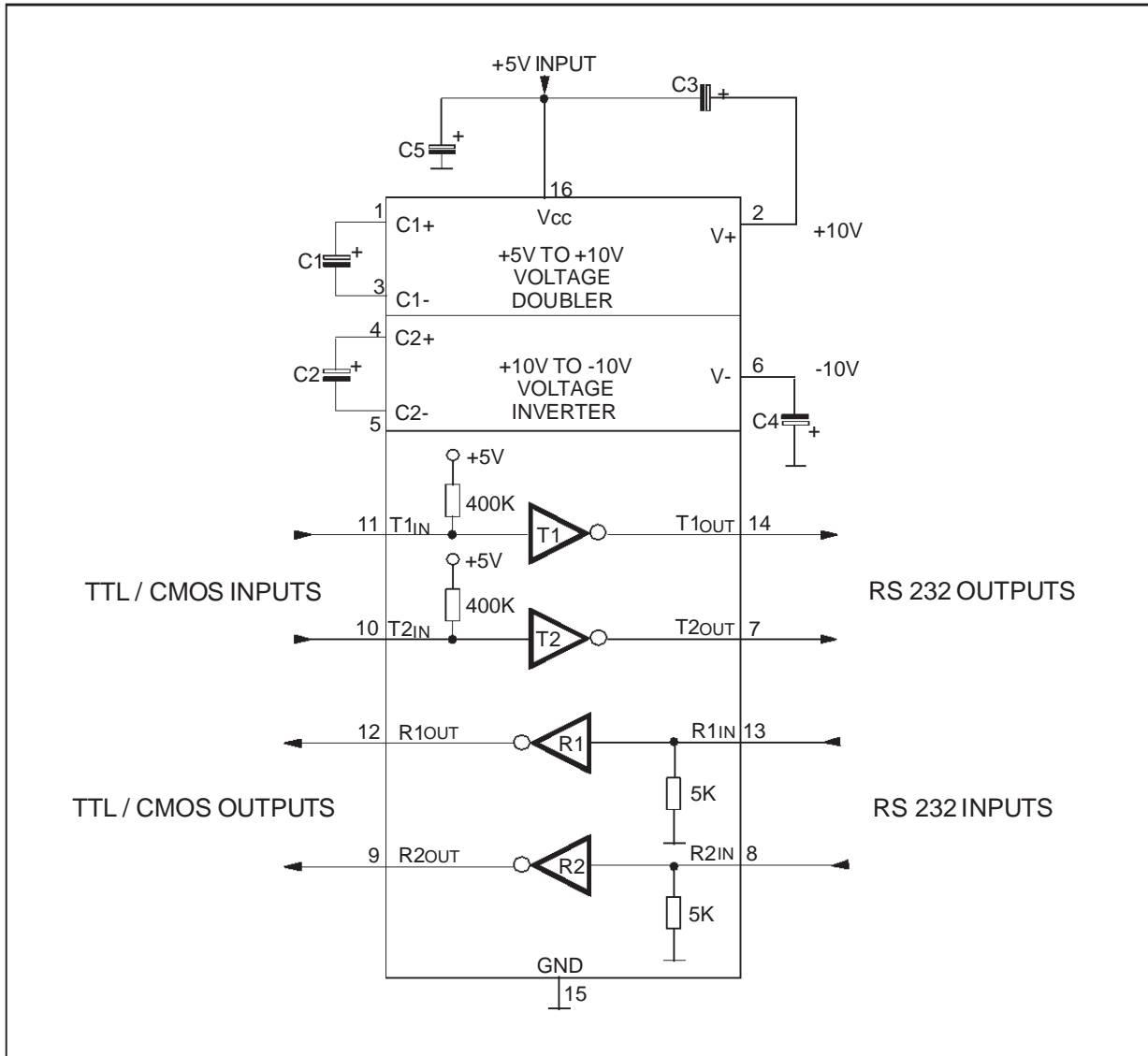
Note 1: Measured from 3V to -3V or from -3V to 3V.

Note 2: One transmitter output is loaded with R_L = 3KΩ to 7KΩ, C_L = 50 to 1000pF**RECEIVER ELECTRICAL CHARACTERISTICS**(C₁ -C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85 °C, unless otherwise specified.Typical Values 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 |
| R _{RIN} | RS-232 Input Resistance | T _A = 25 °C, | 3 | 5 | 7 | KΩ |
| V _{RIL} | RS-232 Input Logic Threshold Low | | 0.8 | 1.3 | | V |
| V _{RIH} | RS-232 Input Logic Threshold High | | | 1.8 | 2.4 | V |
| V _{RIHYS} | RS-232 Input Hysteresis | V _{CC} = 5 V | 0.2 | 0.5 | 1 | V |
| V _{ROL} | TTL/CMOS Output Voltage Low | I _{OUT} = 3.2mA (to V _{CC}) | | 0.2 | 0.4 | V |
| V _{ROH} | TTL/CMOS Output Voltage High | I _{OUT} = 1mA (to GND) | 3.5 | V _{CC} -0.2 | | V |
| I _{SCR} | Receiver Output Short Circuit Current | to GND to V _{CC} | 2 10 | 10 30 | | mA mA |
| t _{dR} | Propagation Delay Time | C _L = 150pF (Note 1) | | 0.1 | 0.5 | μs |

Note 1: RS-232 IN to TTL-CMOS OUT (from 50% to 50%)

APPLICATION CIRCUITS (note 1, note 2)

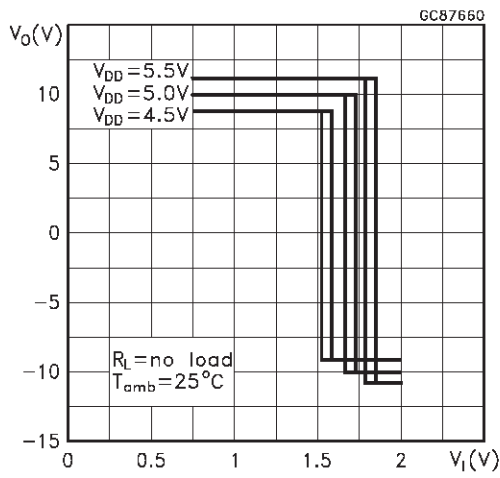


Note 1: C₁₋₄ capacitors can even be 1 μF ones.
 Note 2: C₁₋₄ can be common or biased capacitors.

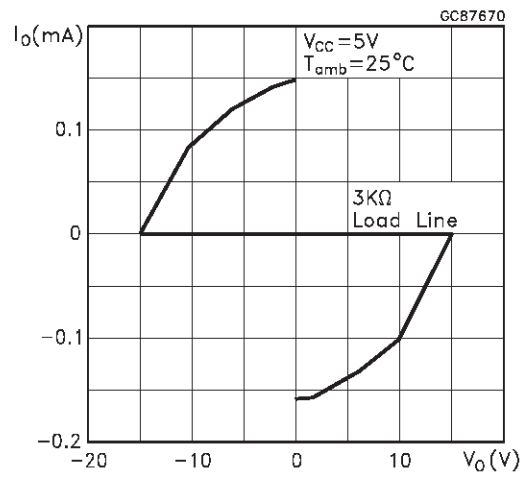
Capacitance Value (μF)

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

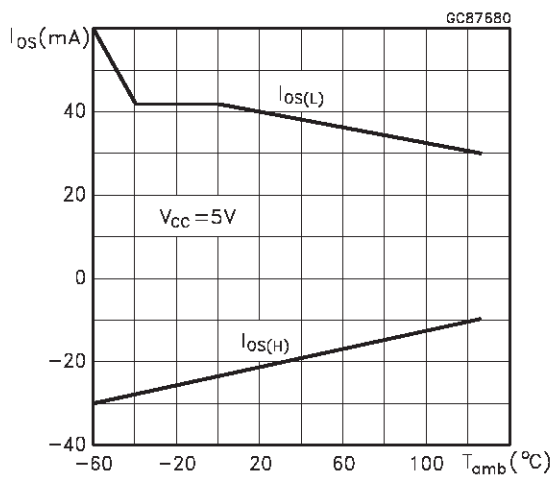
Driver Voltage Transfer Characteristics



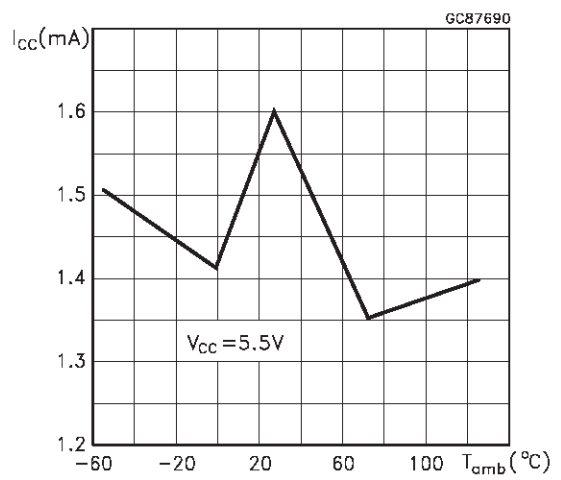
Driver Output Current vs Output Voltage



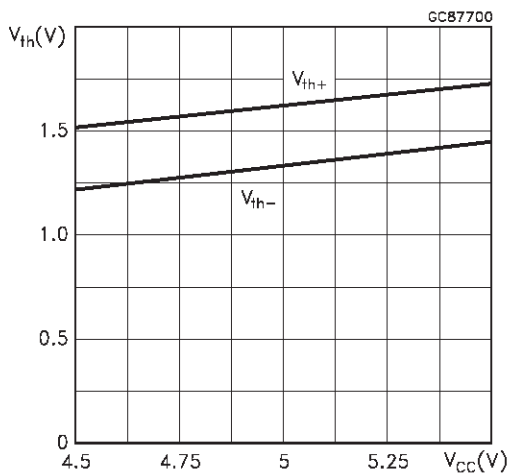
Driver Short Circuit Output Current vs Temperature



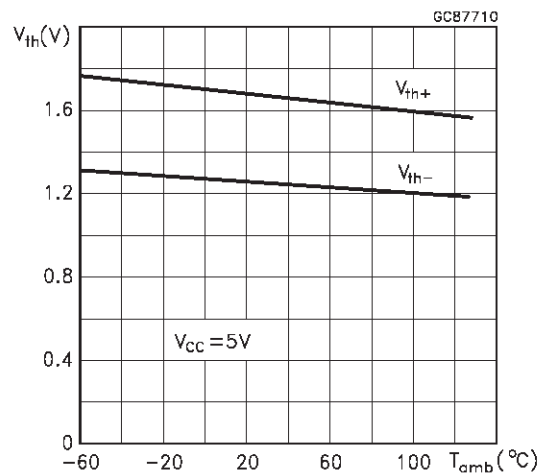
Driver Short Circuit Supply Current vs Temperature



Receiver Threshold vs Supply Voltage

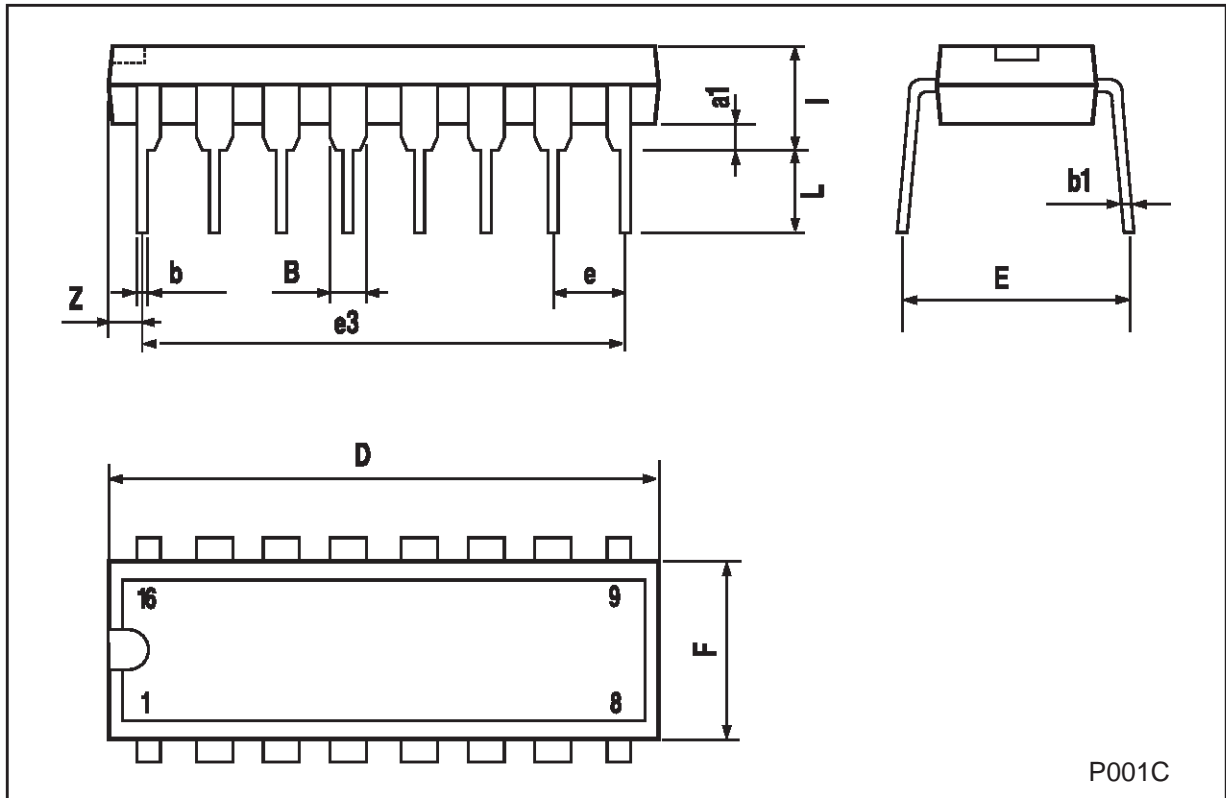


Receiver Threshold vs Temperature



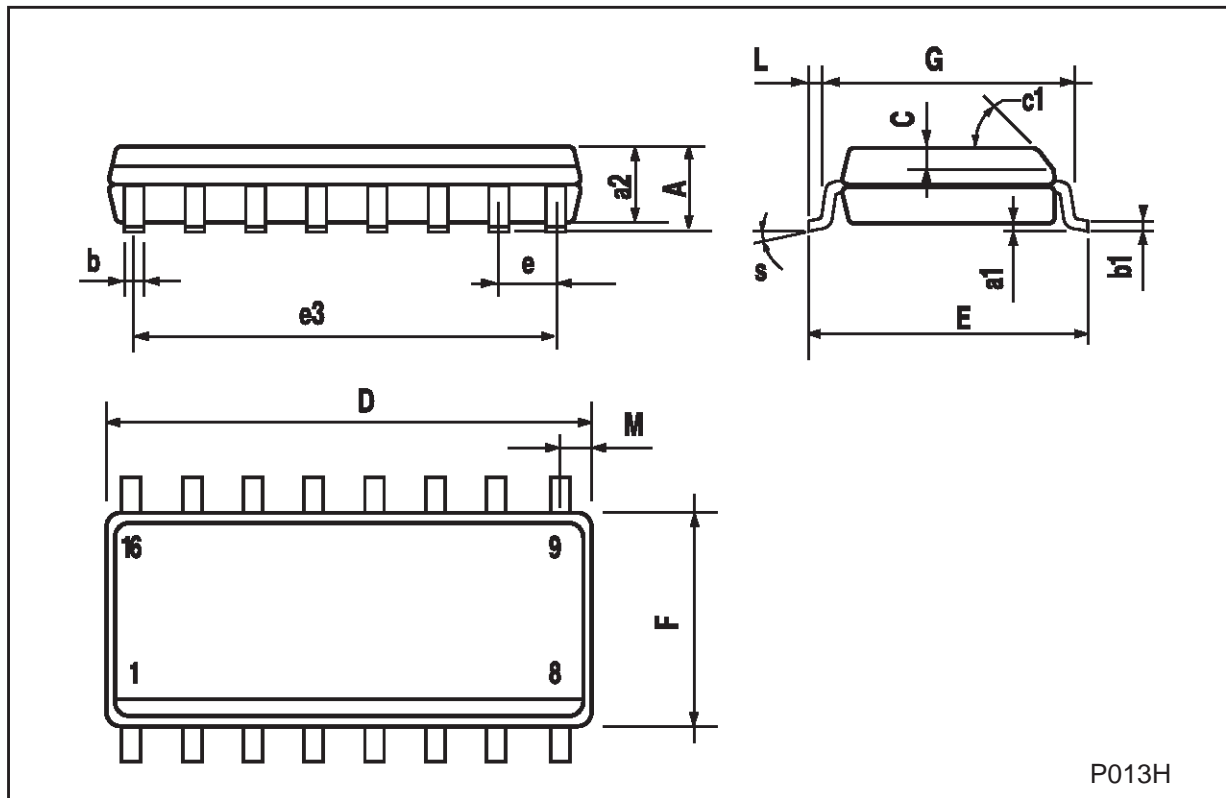
Plastic DIP-16 (0.25) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.77 | | 1.65 | 0.030 | | 0.065 |
| b | | 0.5 | | | 0.020 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 20 | | | 0.787 |
| E | | 8.5 | | | 0.335 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 17.78 | | | 0.700 | |
| F | | | 7.1 | | | 0.280 |
| l | | | 5.1 | | | 0.201 |
| L | | 3.3 | | | 0.130 | |
| Z | | | 1.27 | | | 0.050 |



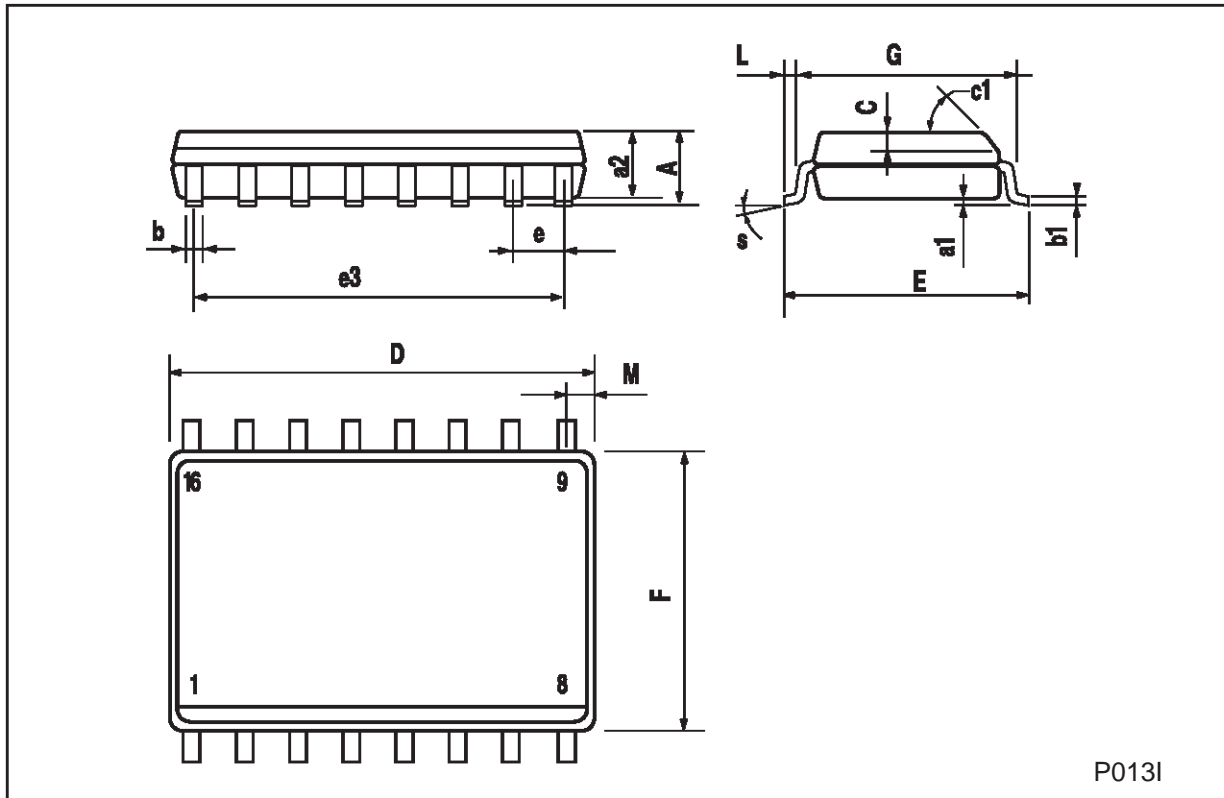
SO-16 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-----------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.2 | 0.004 | | 0.007 |
| a2 | | | 1.65 | | | 0.064 |
| b | 0.35 | | 0.46 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | | 0.5 | | | 0.019 | |
| c1 | 45 (typ.) | | | | | |
| D | 9.8 | | 10 | 0.385 | | 0.393 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 8.89 | | | 0.350 | |
| F | 3.8 | | 4.0 | 0.149 | | 0.157 |
| G | 4.6 | | 5.3 | 0.181 | | 0.208 |
| L | 0.5 | | 1.27 | 0.019 | | 0.050 |
| M | | | 0.62 | | | 0.024 |
| S | 8 (max.) | | | | | |



SO16L MECHANICAL DATA

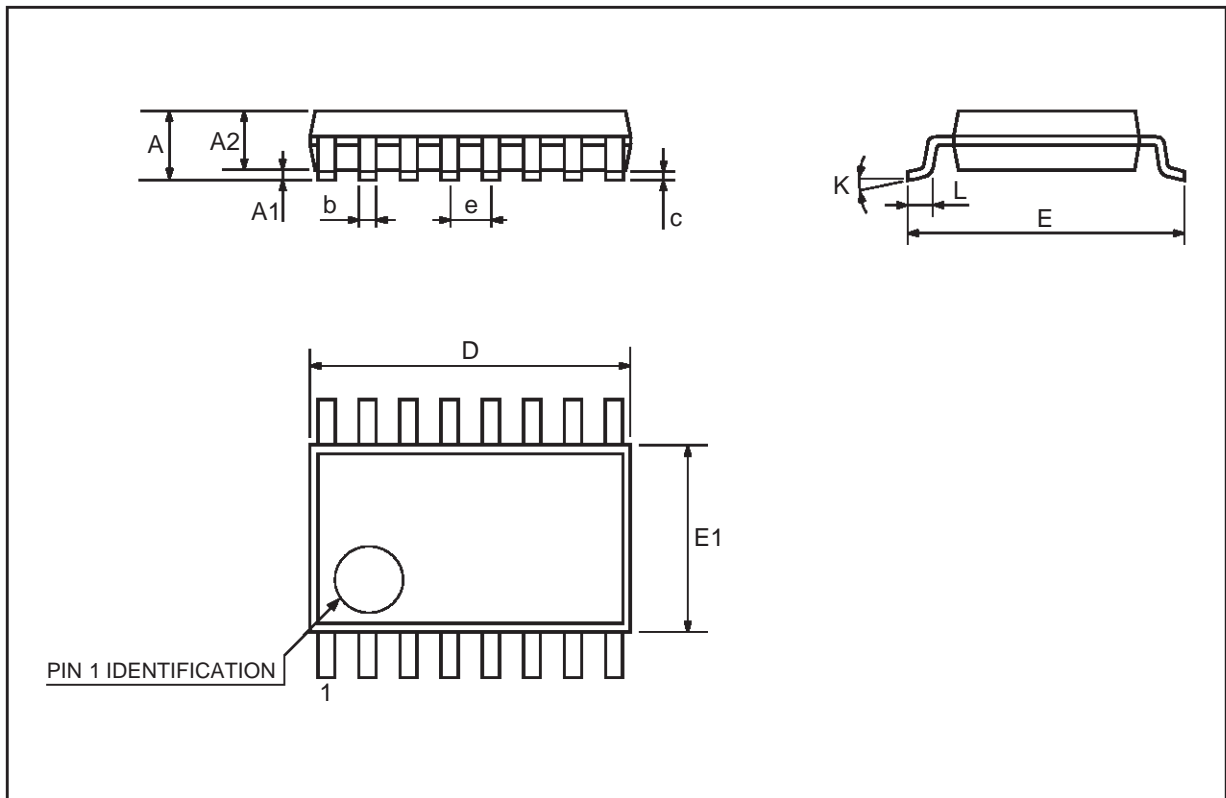
| DIM. | mm | | | inch | | |
|------|-----------|------|-------|--------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.1 | | 0.2 | 0.004 | | 0.008 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.012 |
| C | | 0.5 | | | 0.020 | |
| c1 | 45 (typ.) | | | | | |
| D | 10.1 | | 10.5 | 0.397 | | 0.413 |
| E | 10.0 | | 10.65 | 0.3.93 | | 0.419 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 8.89 | | | 0.350 | |
| F | 7.4 | | 7.6 | 0.291 | | 0.300 |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.75 | | | 0.029 |
| S | 8 (max.) | | | | | |



P0131

TSSOP16 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 | | 0.20 | 0.0035 | | 0.0079 |
| D | 4.9 | 5 | 5.1 | 0.193 | 0.197 | 0.201 |
| 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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