

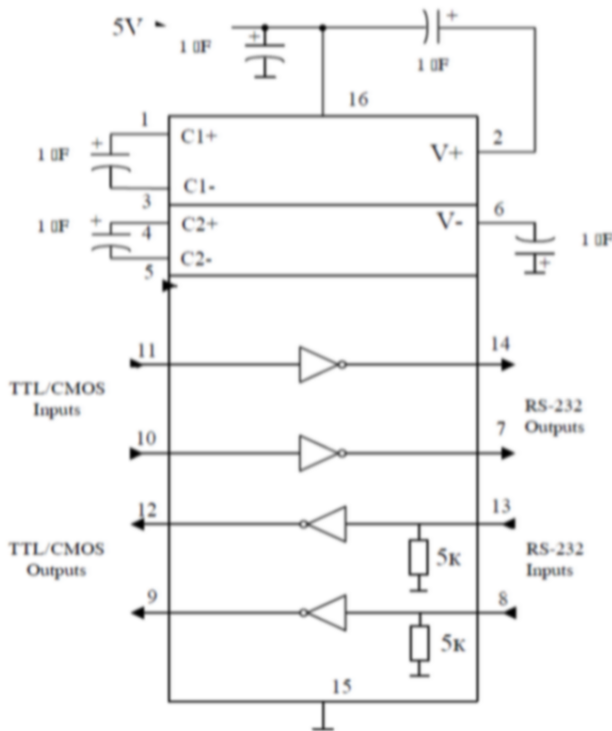
+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

The MAX232 have two drives and two receivers. The drivers and receivers meet all EIA/TIA-232 and CCITT V.28 specifications at data rates up to 120 kbps when loaded in accordance with the EIA/TIA-232 specification

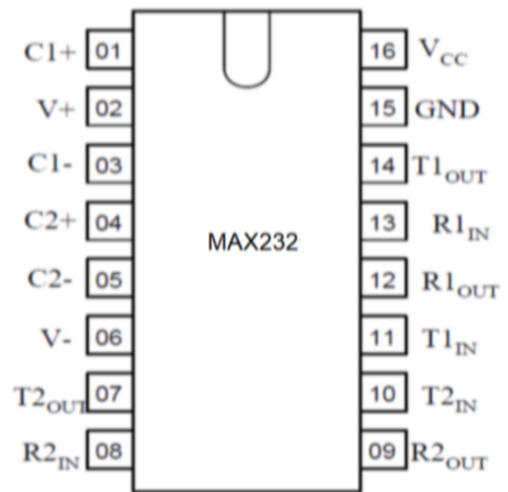
- Operate from Single +5 V Power Supply;
- Guaranteed 120 kbps Data Rate;
- Latchup Free;
- ESD Protection $\pm 2\text{kV}$



Typical Operating Circuit



Pin configuration



+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers
Pin descriptions

| Pin No | Symbol | Function |
|--------|-------------------|---|
| 01 | C1+ | Terminal for positive charge-pump capacitor |
| 02 | V+ | +2 V _{CC} voltage generated by the charge-pump |
| 03 | C1- | Terminal for positive charge-pump capacitor |
| 04 | C2+ | Terminal for negative charge-pump capacitor |
| 05 | C2- | Terminal for negative charge-pump capacitor |
| 06 | V- | -2 V _{CC} voltage generated by the charge-pump |
| 07 | T2 _{OUT} | RS – 232 Driver Output |
| 08 | R2 _{IN} | RS – 232 Receiver Input |
| 09 | R2 _{OUT} | RS – 232 Receiver Output |
| 10 | T2 _{IN} | RS – 232 Driver Input |
| 11 | T1 _{IN} | RS – 232 Driver Input |
| 12 | R1 _{OUT} | RS – 232 Receiver Output |
| 13 | R1 _{IN} | RS – 232 Receiver Input |
| 14 | T1 _{OUT} | RS – 232 Driver Output |
| 15 | GND | Ground |
| 16 | V _{CC} | + 4.5 V to 5.5 V Supply Voltage Input |

Absolute maximum conditions

| Symbol | Parameter | Rate | | Unit |
|-------------------|---|-----------------------|----------------------|------|
| | | min | max | |
| V _{CC} | Supply voltage | -0.3 | 6.0 | V |
| V+ | Transmitter high output voltage | V _{CC} – 0.3 | 14 | V |
| V- | Transmitter low output voltage | -14 | +0.3 | |
| V _{TIN} | Transmitter input voltage | -0.3 | V _{CC} +0.3 | |
| V _{RIN} | Receiver input voltage | -30 | 30 | V |
| V _{TOUT} | Output voltages (transmitters) | V ₋ -0.3 | V ₊ +0.3 | |
| V _{ROUT} | Output voltages (receivers) | -0.3 | V _{CC} +0.3 | |
| P _D | Power dissipation DIP – package (derate 10.53 mW/°C above 70 °C) SO – package (derate 9.52 mW/°C above 70 °C) | - | 842 762 | mW |
| I _{SC} | Short-Circuit Duration (T _{out}) | - | Continu- ous | |
| T _{stg} | Storage temperature | -60 | 150 | °C |
| T _A | Operating voltage range | 0 | 70 | °C |

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ELECTRICAL CHARACTERISTICS

 (V_{CC} = 4.5V to 5.5V, C1-C4 = 1μF; T_A = -40 to +85°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Max | Units |
|--|--------------------------------|--|------|------|-------|
| DC CHARACTERISTICS | | | | | |
| V _{CC} | Operating Voltage Range | V _{IL} =0V | 4.5 | 5.5 | V |
| I _{CC} | V _{CC} Supply Current | No load, T _A = 25°C | | 10.0 | mA |
| LOGIC | | | | | |
| I _I | Input Leakage Current | T _{IN} = 0V to V _{CC} | 0.2 | ±10 | μA |
| V _{IL} | Input Threshold Low | T _{IN} | | 0.8 | V |
| V _{IH} | Input Threshold High | T _{IN} | 2.0 | | V |
| V _{OL} | Output Voltage Low | R _{OUT} ; I _{OUT} = 3.2mA | | 0.4 | V |
| V _{OH} | Output Voltage High | R _{OUT} ; I _{OUT} = -1.0mA | 3.5 | | V |
| RECEIVER INPUTS | | | | | |
| V _{RIN} | Input Voltage Range | All parts, normal operation | -30 | +30 | V |
| V _{ff} | Input Threshold Low | T _A = +25°C, V _{CC} =5V | 0.8 | | V |
| I _{on} | Input Threshold High | T _A = +25°C, V _{CC} =5V | - | 2.4 | V |
| V _h | Input Hysteresis | V _{CC} = 5 V | 0.2 | 1.0 | V |
| R _I | Input Resistance | T _A = +25°C, V _{CC} =5V | 3 | 7 | kΩ |
| TRANSMITTER OUTPUTS | | | | | |
| Δ V _O | Output Voltage Swing | All driver inputs loaded with 3kΩ to ground | ±5.0 | | V |
| R _O | Output resistance | V _{CC} =V+=V-=0V; V _{OUT} =±2V | 300 | | Ω |
| I _{SC} | Output Short-Circuit Current | | | ±60 | mA |
| TIMING CHARACTERISTICS | | | | | |
| ST | Maximum Data Rate | R _L =3.0kΩ to 7 kΩ, C _L =50pF to 1000pF, one transmitter switching | 120 | | kbps |
| t _{PLHR} , t _{PHLR} | Receiver Propagation Delay | C _L = 150pF All parts, normal operation (Fig. 1) | | 10 | μS |
| t _{PLHT} , t _{PHLT} | Transmitter Propagation Delay | R _L =3.0kΩ, C _L =2500pF, all transmitters loaded (Fig. 2) | | 6.0 | μS |
| SR | Transition-Region Slew Rate | T _A = 25°C, V _{CC} = 5V, R _L =3.0kΩ to 7 kΩ, C _L =50pF to 2500pF, measured from -3V to +3V or +3V to -3V (Fig. 3) | 3 | 30 | V/μS |

Timing diagram

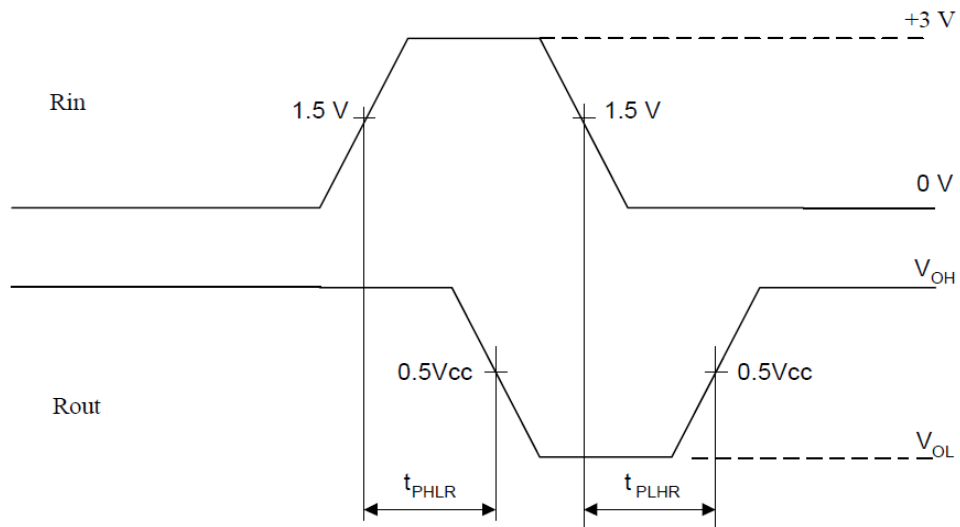


Figure 1

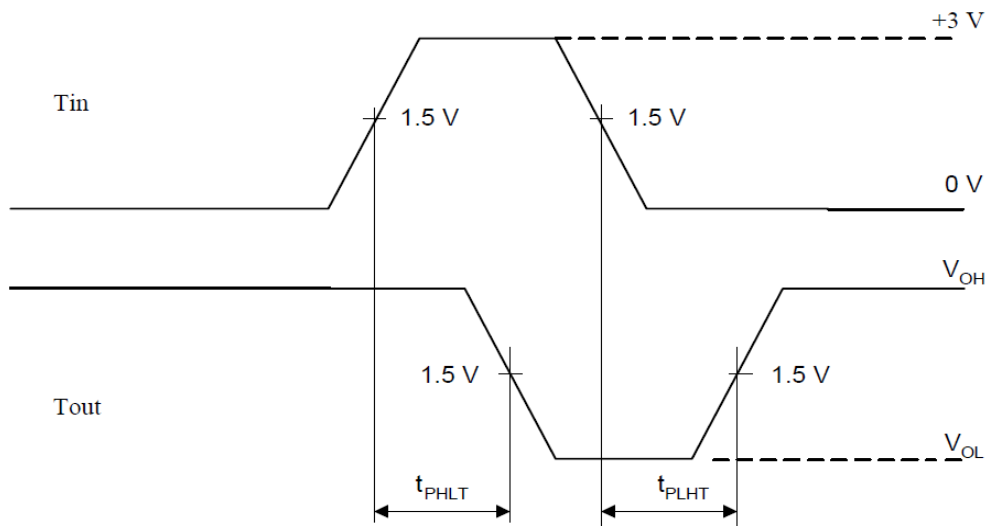


Figure 2

+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

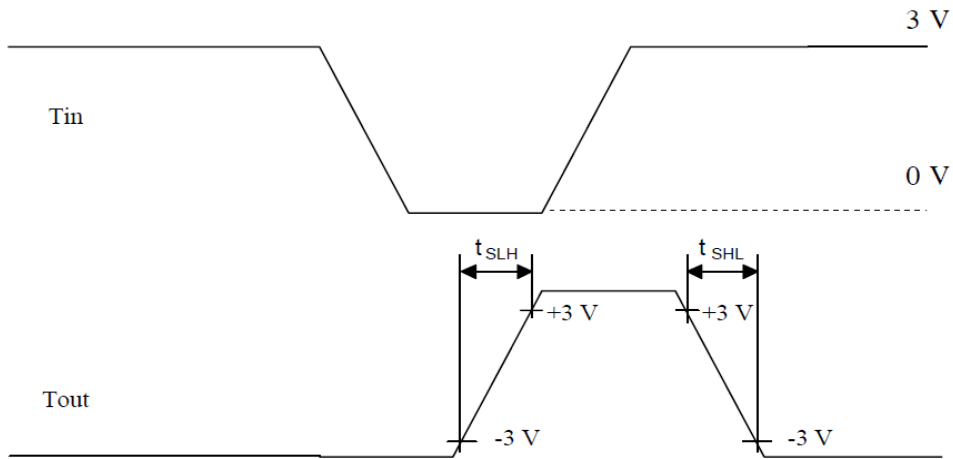
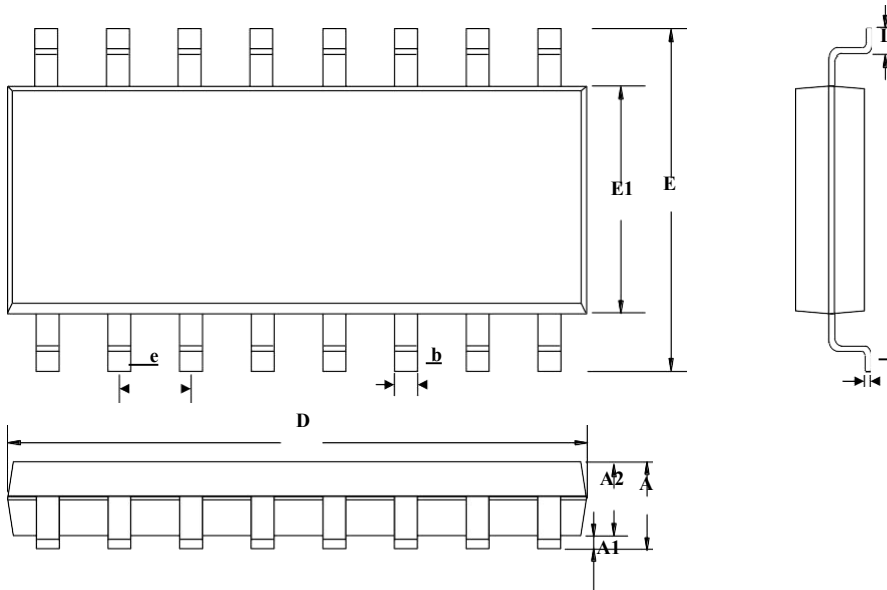


Figure 3

+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

PACKAGE OUTLINE

SOP-16
UNIT:mm



| SYMBOL | MILLIMETER | | |
|--------|------------|------|-------|
| | MIN | NOM | MAX |
| A | — | — | 1.80 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | 1.25 | 1.45 | 1.65 |
| b | 0.33 | — | 0.51 |
| c | 0.17 | — | 0.25 |
| D | 9.50 | — | 10.20 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.70 | — | 4.10 |
| e | 1.27BSC | | |
| L | 0.45 | 0.60 | 0.80 |

Ordering information

| Order code | Package | Baseqty | Deliverymode | Operating temperature range |
|---------------|---------|---------|---------------|-----------------------------|
| UMW MAX232CSE | SOP-16 | 2500 | Tape and reel | 0°C - +70°C |