## DESCRIPTION

MAX232CSE is purposed for application in high-performance information processing systems and control devices of wide application.
Input voltage levels are compatible with standard CMOS levels.

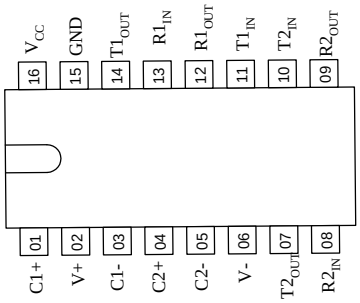
## FEATURES

- Output voltage levels are compatible with input levels of K-MOS, N-MOS and TTL integrated circuits.
- Low input current: 1.0 μA; 0.1 μA at T = 25 °C.
- Output current 24 mA.
- Latching current not less than 450 mA at T = 25°C
- Tolerable value of static potential not less than 2000V

## APPLICATIONS

- Portable Computers
- Battery-Powered RS-232 Systems
- Interface Translation
- Low-Power Modems
- Terminals

## PIN CONFIGURATION




SOP -16

## PIN DESCRIPTION

| Pin No. | Symbol | Pin name |
|---|---|---|
| 01 | C1+ | Output of external capacitance of positive voltage multiplier unit |
| 02 | V+ | Output of positive voltage of multiplier unit |
| 03 | C1- | Output of external capacitance of positive voltage multiplier unit |
| 04 | C2+ | Output of external capacitance of negative voltage multiplier unit |
| 05 | C2- | Output of external capacitance of negative voltage multiplier unit |
| 06 | V- | Output of negative voltage of multiplier unit |
| 07 | $T2_{OUT}$ | Output of transmitter data (levels RS – 232) |
| 08 | $R2_{IN}$ | Input of receiver data (levels RS – 232) |
| 09 | $R2_{OUT}$ | Output of receiver data (levels TTL/KMOS) |
| 10 | $T2_{IN}$ | Input of transmitter data (levels TTL/KMOS) |
| 11 | $T1_{IN}$ | Input of transmitter data (levels TTL/KMOS) |
| 12 | $R1_{OUT}$ | Output of receiver data (levels TTL/KMOS) |
| 13 | $R1_{IN}$ | Input of receiver data (levels RS – 232) |
| 14 | $T1_{OUT}$ | Output of transmitter data (levels RS – 232) |
| 15 | GND | Common output |
| 16 | $V_{CC}$ | Supply output of voltage source |

**Truth table**

| Inputs | Outputs |
|---|---|
| $R_{IN}$, $T_{IN}$ | $R_{OVT}$, $T_{OVT}$ |
| H | L |
| L | H |

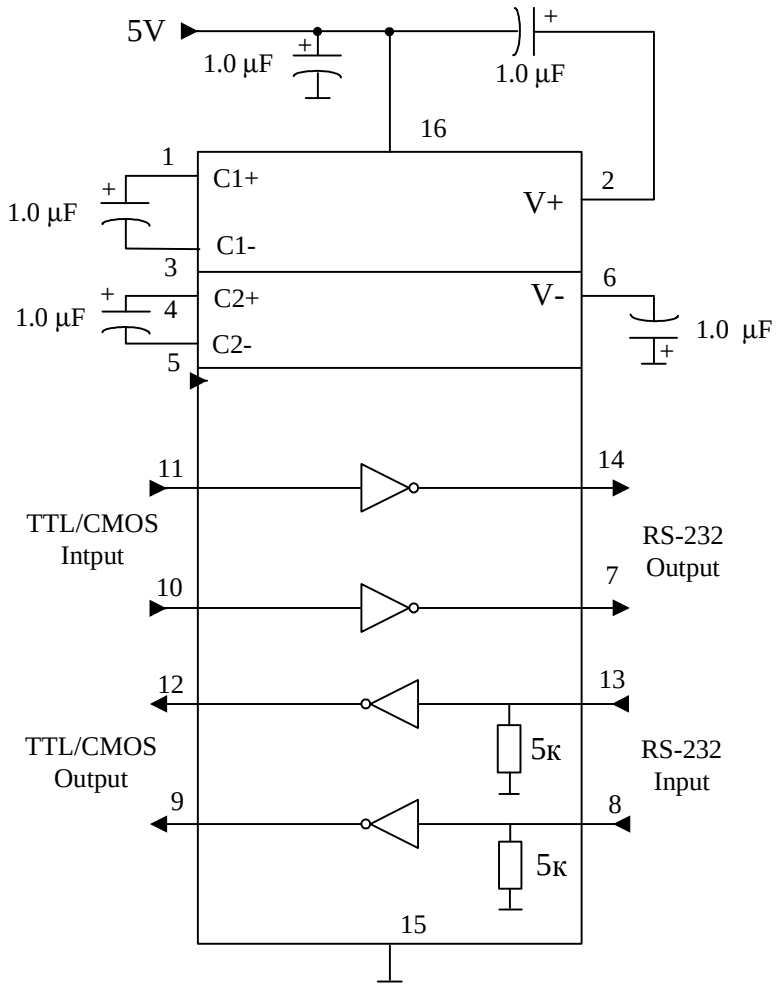
Note -
H – voltage high level;
L – low voltage level

**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- | Transmitter low output voltage | -0.3 | -14 | |
| $V_{TIN}$ | Transmitter input voltage | -0.3 | V+ +0.3 | |
| $V_{RIN}$ | Receiver input voltage | -30 | 30 | |
| $P_D$ | Dissipated power<br>DIP – package<br>SO - package | - | <br>842<br>762 | mW |
| $I_{SC}$ | Output current of transmitter short circuit | - | Continu-ously | mA |
| Ta | Ambient temperature | -60 | 150 | $^{O}C$ |

## Recommended Operating Conditions

| Symbol | Parameter | Rate | | Unit |
|---|---|---|---|---|
| | | min | max | |
| $V_{CC}$ | Supply voltage | 4.5 | 5.5 | V |
| V+ | Transmitter output high voltage | 5.0 | - | |
| V- | Transmitter output low voltage | -5.0 | - | |
| $V_{TIN}$ | Transmitter input voltage | 0 | $V_{CC}$ | |
| $V_{RIN}$ | Receiver input voltage | -30 | 30 | |
| $I_{SC}$ | Transmitter short circuit output current | - | ±60 | mA |
| Ta | Ambient temperature | -40 | 85 | °C |



## Static parameters

| Symbol | Parameter | Test conditions | Rate | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | 25°C | | от -40 °C до 85 °C | | |
| | | | min | max | min | max | |
| $I_{CC}$ | Consumption current static | $V_{CC}$ =5.5 V<br>$V_{IL}$ = 0 V | - | 10.0 | - | 14.0* | mA |
| **Receiver electrical parameters** | | | | | | | |
| $V_h$ | Hysteresis voltage | $V_{CC}$ =5.0 V | 0.2 | 0.9 | 0.2 | 1.0 | V |
| $V_{On}$ | On (operation) voltage | $V_O \leq$ 0.1 V<br>$I_{OL} \leq$ 20 mkA | - | 2.4 | - | 2.3 | |
| $V_{off}$ | Off (dropout) voltage | $V_O \geq V_{CC}$ -0.1 V<br>$I_{OH} \leq$ -20 µA | 0.8 | - | 0.9 | - | |
| $V_{OL}$ | Output low voltage | $I_{OL}$ = 3.2 мА<br>$V_{CC}$ = 4.5 V<br>$V_{IH}$ = 2.4 V | - | 0.3 | - | 0.4 | |
| $V_{OH}$ | Output high voltage | $I_{OH}$ = -1.0 мА<br>$V_{CC}$ = 4.5 V<br>$V_{IL}$ = 0.8 V | 3.6 | - | 3.5 | - | |
| $R_I$ | Input resistance | $V_{CC}$ = 5.0 V | 3.0 | 7.0 | 3.0 | 7.0 | kOhm |
| **Transmitter electrical parameters** | | | | | | | |
| $V_{OL}$ | Output low voltage | $V_{CC}$ = 4.5 V<br>$V_{IH}$ = 2.0 V<br>$R_L$ = 3.0 kOhm | - | -5.2 | - | -5.0 | V |
| $V_{OH}$ | Output high voltage | $V_{CC}$ = 4.5 V<br>$V_{IL}$ = 0.8 V<br>$R_L$ = 3.0 kOhm | 5.2 | - | 5.0 | - | |
| $I_{IL}$ | Input low current | $V_{CC}$ =5.5 V<br>$V_{IL}$ = 0 V | - | -1.0 | - | -10.0 | µA |
| $I_{IH}$ | Input high current | $V_{CC}$ =5.5 V<br>$V_{IH}$ = $V_{CC}$ | | 1.0 | | 10.0 | |
| SR | Speed of output front change | $V_{CC}$ =5.0 V<br>$C_L$ =50 - 1000 pF<br>$R_L$ = 3.0 - 7.0 kOhm | 3.0 | 30 | 2.7 | 27 | V/mks |
| $R_O$ | Output resistance | $V_{CC}$ = V+ = V- = 0 V<br>$V_O$ = ± 2 V | 350 | - | 300 | - | Ohm |
| $I_{SC}$ | Short circuit output current | $V_{CC}$ =5.5 V<br>$V_O$ = 0 V<br>$V_I$ = $V_{CC}$<br>$V_I$ = 0 V | | -50<br>50 | | -60<br>60 | mA |
| ST | Speed of information transmission | $V_{CC}$ =4.5 V<br>$C_L$ = 1000 pF<br>$R_L$ = 3.0 kOhm<br>$t_W$ = 7µS (for extreme -$t_W$ = 8µS) | 140 | - | 120 | - | kbps |

## Dynamic parameters

| Symbol | Parameter | Test conditions | Rate | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | 25 °C | | from -40 °C to 85 °C | | |
| | | | min | max | min | max | |
| $t_{PHLR}$ ($t_{PLHR}$) | Signal propagation delay time when switching on (off) | $V_{CC}$ = 4.5 V<br>$C_L$ = 150 pF<br>$V_{IL}$ = 0 V<br>$V_{IH}$ = 3.0 V<br>$t_{LH} = t_{HL} \leq 10$ ns | - | 9.7 | - | 10 | µS |
| $t_{PHLT}$ ($t_{PLHT}$) | Signal propagation delay time when switching on (off) | $V_{CC}$ = 4.5 V<br>$C_L$ = 2500 pF<br>$V_{IL}$ = 0 V<br>$V_{IH}$ = 3.0 V<br>$R_L$ = 3 kOhm<br>$t_{LH} = t_{HL} \leq 10$ ns | | 5.0* | | 6.0* | |

## Capacitance

| Symbol | Parameter | $V_{CC}$, V | Rate | Unit |
|---|---|---|---|---|
| $C_{IN}$ | Input capacitance | 5.0 | 9.0 | pF |
| $C_{PD}$ | Dynamic capacitance | | 90 | |

Timing diagram when measuring IC dynamic parameters

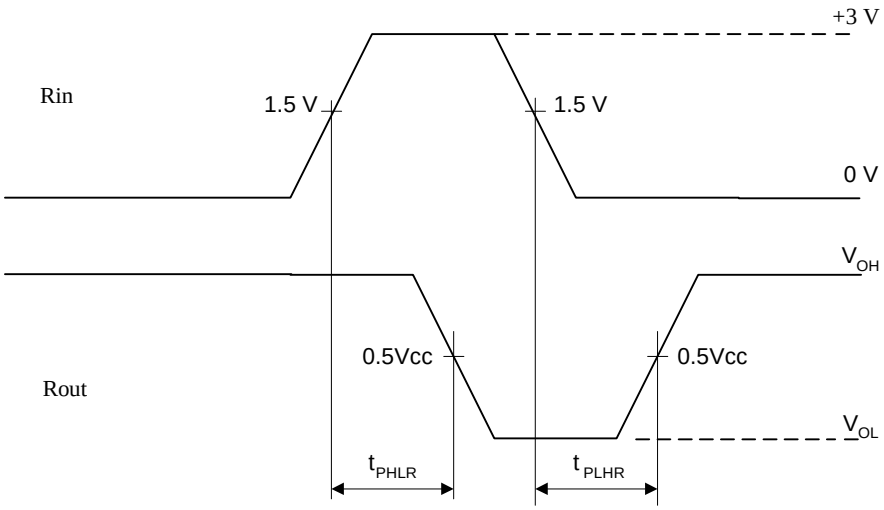



**Figure 3**

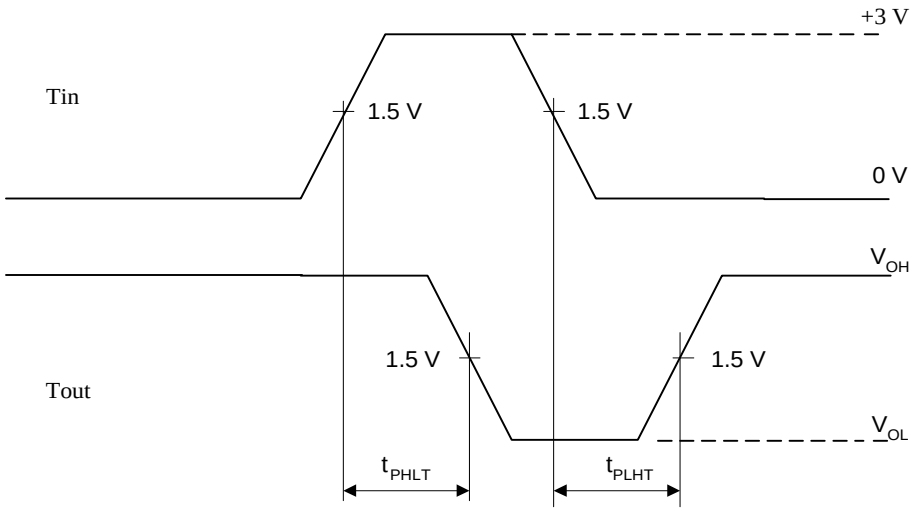



**Figure 4**

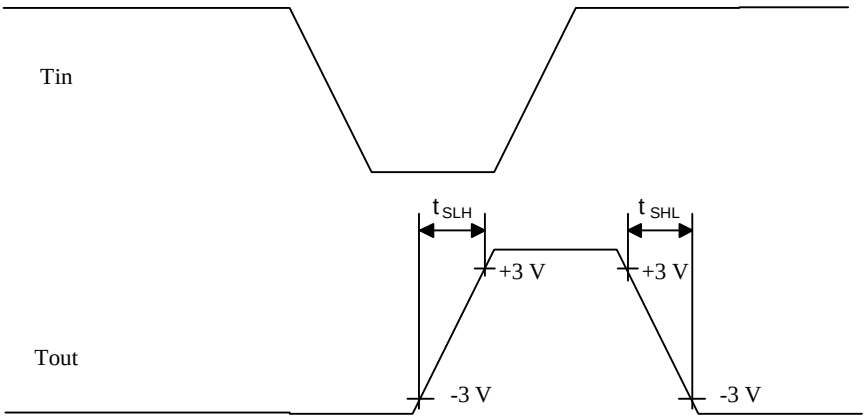



**Figure 5**

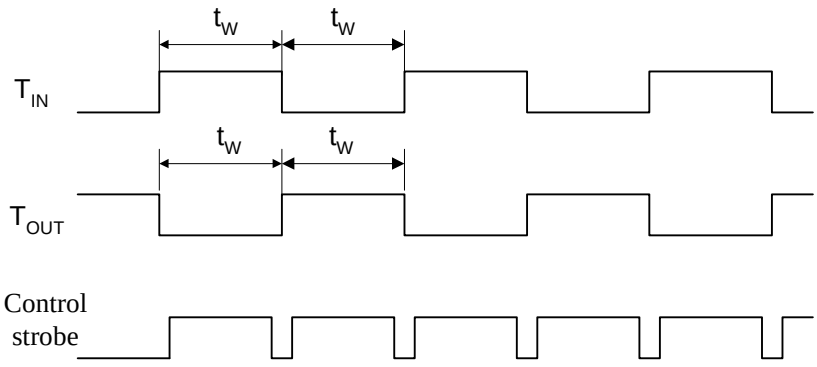
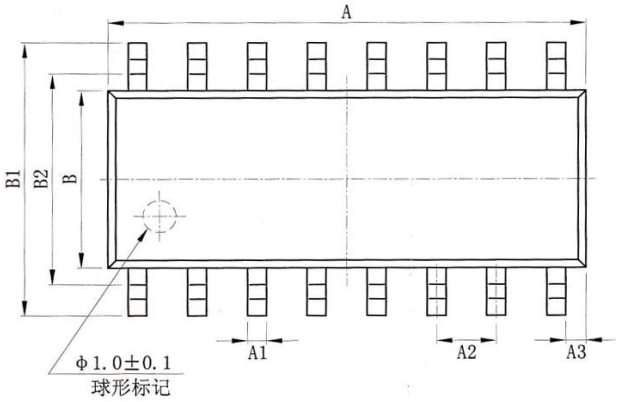
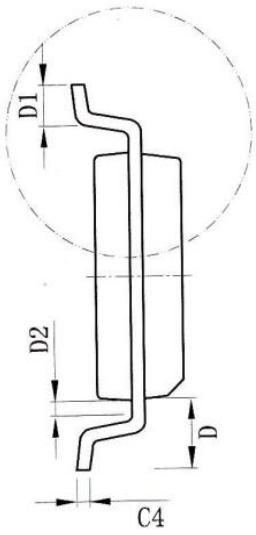


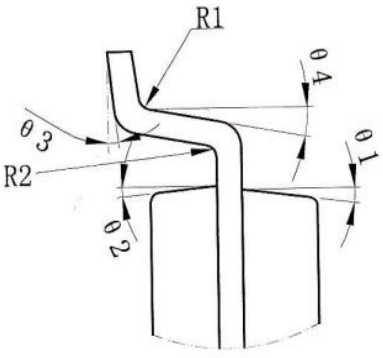

**Figure 6**

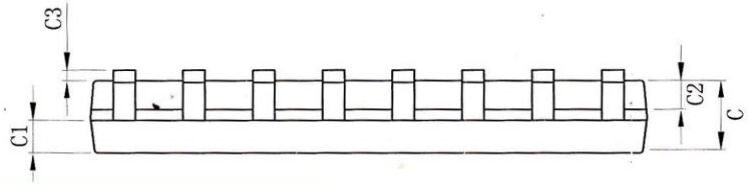
## SOP-16 Package overall dimensions

| SYMBOL | MIN/mm | MAX/mm |
|---|---|---|
| A | 9.80 | 10.00 |
| A1 | 0.356 | 0.456 |
| A2 | 1.27TYP | |
| A3 | 0.302TYP | |
| B | 3.85 | 3.95 |
| B1 | 5.84 | 6.24 |
| B2 | 5.00 TYP | |
| C | 1.40 | 1.60 |
| C1 | 0.61 | 0.71 |
| C2 | 0.54 | 0.64 |
| C3 | 0.05 | 0.25 |
| C4 | 0.203 | 0.233 |
| D | 1.05 TYP | |
| D1 | 0.40 | 0.70 |
| D2 | 0.15 | 0.25 |
| R1 | 0.20TYP | |
| R2 | 0.20TYP | |
| θ1 | 8°~12°TYP4 | |
| θ2 | 8°~12°TYP4 | |
| θ3 | 0°~8° | |
| θ4 | 4°~12° | |



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