



AOS  
SEMICONDUCTOR

## 产品规格说明书

Product Data Sheet

### SP232EEN

WEB | [www.aossemi.cn](http://www.aossemi.cn) 



电源管理IC



通信接口芯片



二三极管



LDO稳压器



逻辑器件



MOSFETs



运算放大器



显示驱动



MCU单片机

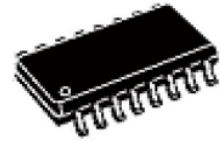


光电器件

## SP232EEN

Data Sheet

RS-232-Chip



SO16

5V Dual channel RS 232 Drivers/Receivers

## FEATURES

- ★ Output voltage levels are compatible with input levels of CMOS and TTL integrated circuits
- ★ Meets AI EIA/TIA-232E and V.28/N.24 Specifications
- ★ Supply voltage range from 5.5V
- ★ Low input current: 1.0μA at 25°C
- ★ Output current 30mA
- ★ Available in SOP-16 Package

## APPLICATIONS

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

## APPLICATIONS

| Device   | Package |
|----------|---------|
| SP232EEN | SOP-16  |

\* Refer to the ordering information for the details.

## DESCRIPTION

The SP232EEN is a dual driver/receiver of RS-232 standard with a single supply voltage and bipolar output voltage of the transmitter formed by a built-In voltage multiplying generator on four 1.0μF external capacitors, designed for use in state-of-the-art high performance computing systems, high-speed electronic devices with high reliability of information exchange between remote objects. Input voltage levels are compatible with standard CMOS and TTL levels.

## ABSOLUTE MAXIMUM RATINGS

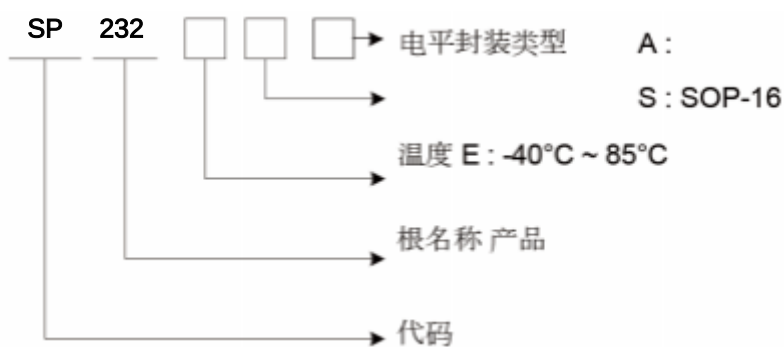
| PARAMETER                             | Symbol     | MIN.         | MAX.           | UNIT |
|---------------------------------------|------------|--------------|----------------|------|
| Supply Voltage                        | $V_{CC}$   | 0.3          | 6.0            | V    |
| Transmitter High Output Voltage       | $V_+$      | $V_{CC}-0.3$ | 9.8            | V    |
| Transmitter Low Output Voltage        | $V_-$      | -9.0         | 0.3            | V    |
| Transmitter Input Voltage             | $V_{TIN}$  | -0.3         | $V_++0.3$      | V    |
| Receiver Input Voltage                | $V_{RIN}$  | -20          | 20             | V    |
| Voltage Applied to Transmitter Output | $V_{TOUT}$ | $V_- - 0.3$  | $V_+ + 0.3$    | V    |
| Voltage Applied to Receiver Output    | $V_{ROUT}$ | -0.3         | $V_{CC} + 0.3$ | V    |
| Storage Temperature Range             | Tstg       | -65          | 150            |      |



## Data Sheet

| PARAMETER                                   | Symbol    | MIN. | MAX.     | UNIT |
|---------------------------------------------|-----------|------|----------|------|
| Supply Voltage                              | $V_{CC}$  | 4.5  | 5.5      | V    |
| Transmitter Input Voltage                   | $V_{TIN}$ | 0    | $V_{CC}$ | V    |
| Receiver Input Voltage                      | $V_{RIN}$ | -20  | 20       | V    |
| Output Current of Transmitter Short Circuit | $I_{SC}$  | -    | $\pm 60$ | mA   |
| Ambient Temperature Range                   | $T_A$     | -40  | +85      |      |

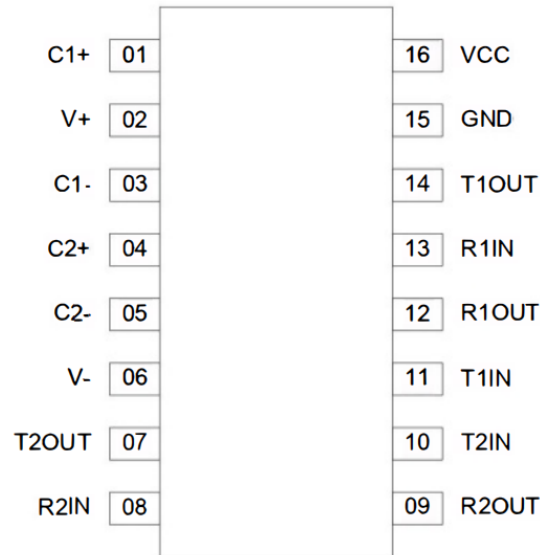
| Package | Oder No. | Package Marking | Compliance | Supplied As |
|---------|----------|-----------------|------------|-------------|
| SOP-16  | SP232EEN | SP232EEN        | RoHS,Green | Tube        |



# SP232EEN

## Data Sheet

### PIN CONFIGURATION



SOP -16 PKG

### PIN DESCRIPTION

| Pin No. | Pin Name | Pin Description                                |
|---------|----------|------------------------------------------------|
| 1       | C1+      | Terminal for Positive Charge-Pump C1 Capacitor |
| 2       | V+       | Positive Voltage Generated by the Charge-Pump  |
| 3       | C1-      | Terminal for Negative Charge-Pump C1 Capacitor |
| 4       | C2+      | Terminal for Positive Charge-Pump C2 Capacitor |
| 5       | C2-      | Terminal for Negative Charge-Pump C2 Capacitor |
| 6       | V-       | Negative Voltage Generated by the Charge-Pump  |
| 7       | T2OUT    | RS-232 Driver Output (Levels RS-232)           |
| 8       | R2IN     | RS-232 Receiver Input (Levels RS-232)          |
| 9       | R2OUT    | RS-232 Receiver Output (Levels TTL/CMOS)       |
| 10      | T2IN     | RS-232 Driver Input (Levels TTL/CMOS)          |
| 11      | T1IN     | RS-232 Driver Input (Levels TTL/CMOS)          |
| 12      | R1OUT    | RS-232 Receiver Output (Levels TTL/CMOS)       |
| 13      | R1IN     | RS-232 Receiver Input (Levels RS-232)          |
| 14      | T1OUT    | RS-232 Driver Output (Levels RS-232)           |
| 15      | GND      | Ground                                         |
| 16      | VCC      | Supply Voltage Input                           |



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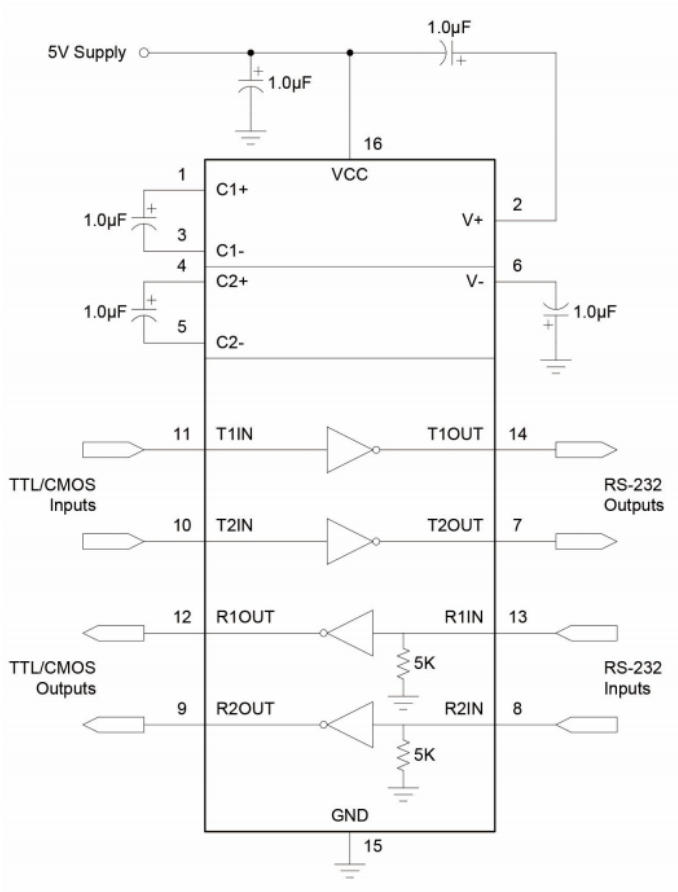
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# SP232EEN

## Data Sheet

### TYPICAL APPLICATION CIRCUIT



### FUNCTION TABLE

| INPUT(RIN, TIN) | OUTPUT(ROUT, TOUT) |
|-----------------|--------------------|
| L(Low Level)    | H(High Level)      |
| H(High Level)   | L(Low Level)       |



## SP232EEN

## Data Sheet

## ELECTRICAL CHARACTERISTICS

(Limits in standard typeface are for TA=25°C, and the limits in boldface type apply over full operating temperature range.)

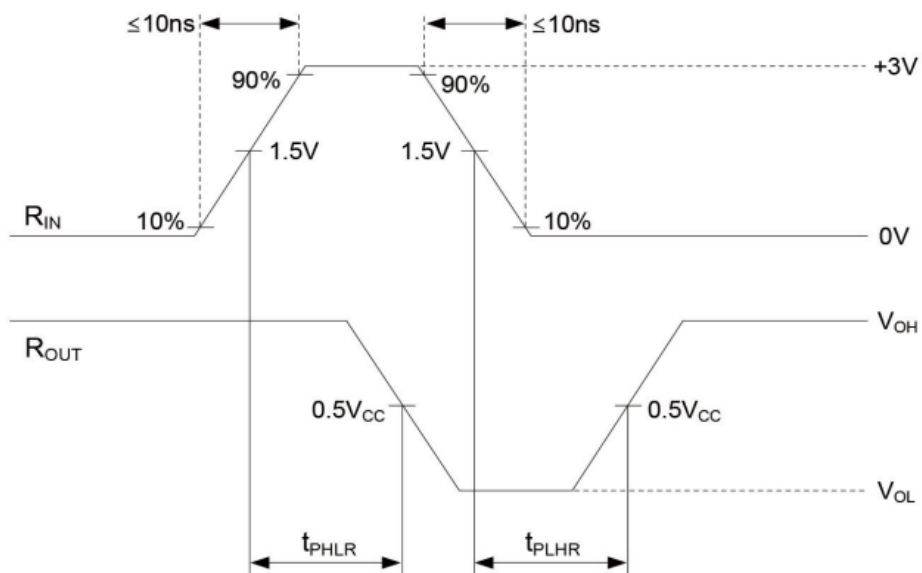
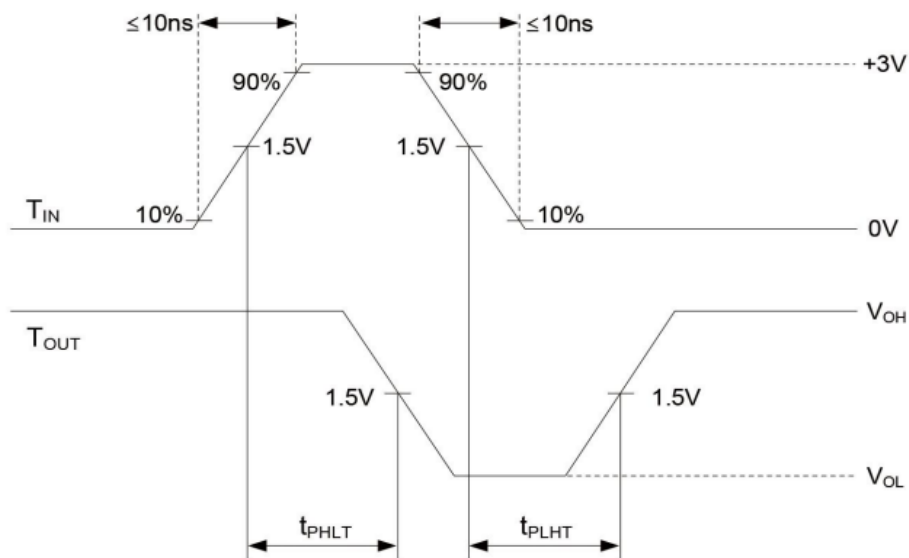
| PARAMETER                                             | SYMBOL                       | TEST CONDITIONS                                                                        | MIN.              | TYP. | MAX.                 | UNIT.      |
|-------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------|-------------------|------|----------------------|------------|
| Supply Current                                        | $I_{cc}$                     | $V_{CC}=5.5V$<br>$V_{IL}=0V$                                                           | -                 | -    | 10.0<br>14.0         | mA         |
| <b>Receiver Parameters</b>                            |                              |                                                                                        |                   |      |                      |            |
| Hysteresis Voltage                                    | $V_h$                        | $V_{CC}=5.0V$                                                                          | 02<br><b>0.2</b>  | -    | 0.9<br><b>1.0</b>    | V          |
| On(Operation) Voltage                                 | $V_{on}$                     | $V_o \leq 0.1V, I_{OL} \leq 20\mu A$                                                   | -                 | -    | 2.4<br><b>2.3</b>    | V          |
| Off(Dropout) Voltage                                  | $V_{off}$                    | $V_o \geq V_{CC} - 0.1V, I_{OH} \leq 20\mu A$                                          | 0.8<br><b>0.9</b> | -    | -                    | V          |
| Output Low Voltage                                    | $V_{OL}$                     | $I_L=3.2mA, V_{CC}=4.5V, V_{IH}=2.4V$                                                  | -                 | -    | 0.4<br><b>0.4</b>    | V          |
| Output High Voltage                                   | $V_{OH}$                     | $I_{OH}=-1.0mA, V_{CC}=4.5V, V_{IL}=0.8V$                                              | 3.6<br><b>3.5</b> | -    | -                    | V          |
| Input Resistance                                      | $R_i$                        | $V_{CC}=5.0V$                                                                          | 3.0<br><b>3.0</b> | -    | 7.0<br><b>7.0</b>    | k $\Omega$ |
| <b>Transmitter Parameters</b>                         |                              |                                                                                        |                   |      |                      |            |
| Output Low Voltage                                    | $V_{OL}$                     | $V_{CC}=4.5V, V_{IH}=2.0V, R_L=30k\Omega$                                              | -                 | -    | -5.2<br><b>-5.0</b>  | V          |
| Output High Voltage                                   | $V_{OH}$                     | $V_{CC}=4.5V, V_{IL}=0.8V, R_I=30k\Omega$                                              | 5.2<br><b>5.0</b> | -    | -                    | V          |
| Input Low Current                                     | $I_L$                        | $V_{CC}=5.5V, V_{IL}=0V$                                                               | -                 | -    | -1.0<br><b>-10.0</b> | $\mu A$    |
| Input High Current                                    | $I_{IH}$                     | $V_{CC}=5.5V, V_{IH}=V_{CC}$                                                           | -                 | -    | 1.0<br><b>10.0</b>   | $\mu A$    |
| Speed Of Output Front Charge                          | $S_R$                        | $V_{CC}=5.0V, C_L=50-1000pF, R_L=3.0-70k\Omega$                                        | 3.0<br><b>2.7</b> | -    | 30<br><b>27</b>      | V/ $\mu s$ |
| Output Resistance                                     | $R_o$                        | $V_{CC}=V_+=V_-=0V, V_o=\pm 2V$                                                        | 350<br><b>300</b> | -    | -                    | $\Omega$   |
| Short Circuit Output Current                          | $I_{SC}$                     | $V_{CC}=5.5V, V_o=0V$                                                                  | $V_i=V_{CC}$      | -    | -50<br><b>-60</b>    | mA         |
|                                                       |                              |                                                                                        | $V_i=0$           | -    | 50<br><b>60</b>      |            |
| Speed Of Information Transmission                     | $S_T$                        | $V_{CC}=4.5V, C_L=1000pF, R_L=3.0k\Omega, t_w=7\mu s$ (for extreme, $t_w=8\mu s$ )     | 140<br><b>120</b> | -    | -                    | kbit/s     |
| <b>Dynamic Parameters</b>                             |                              |                                                                                        |                   |      |                      |            |
| Signal Propagation Delay Time When Switching On (off) | $t_{PHLR}$<br>( $t_{PLHR}$ ) | $V_{CC}=4.5V, C_L=150pF, V_{IL}=0V, V_{IH}=3.0V, t_{LH}=t_{HL} \leq 10ns$              | -                 | -    | 9.7<br><b>10.0</b>   | $\mu s$    |
| Signal Propagation Delay Time When Switching On (off) | $t_{PHLT}$<br>( $t_{PLHT}$ ) | $V_{CC}=4.5V, C_L=2500pF, V_{IL}=0V, V_{IH}=3.0V, R=3k\Omega, t_{LH}=t_{HL} \leq 10ns$ | -                 | -    | 5.0<br><b>6.0</b>    | $\mu s$    |



## SP232EEN

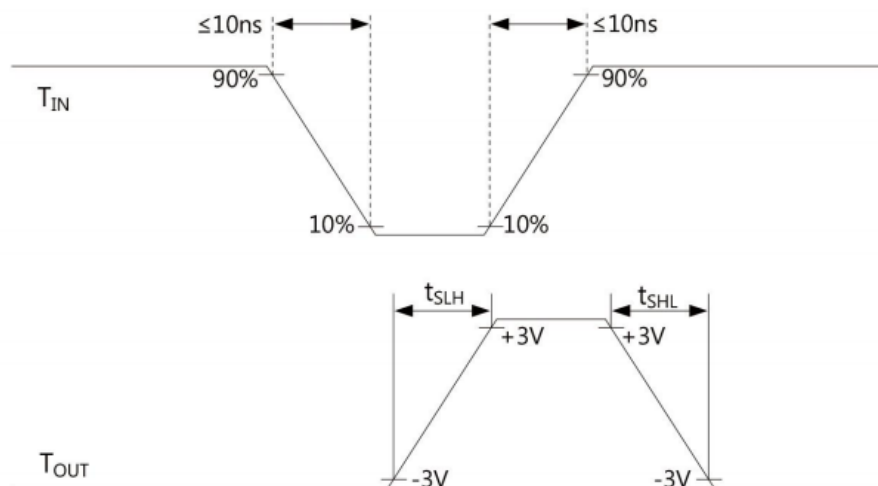
## Data Sheet

## TIMING DIAGRAM

Figure 1.  $t_{PHL}$  and  $t_{PLH}$  waveforms of ReceiverFigure 2.  $t_{PLH}$  and  $t_{PLH}$  waveforms of Transmitter

## SSP232EEN

## Data Sheet

Figure 3.  $t_{SLH}$  and  $t_{SHL}$  waveforms of Transmitter

## REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.

