

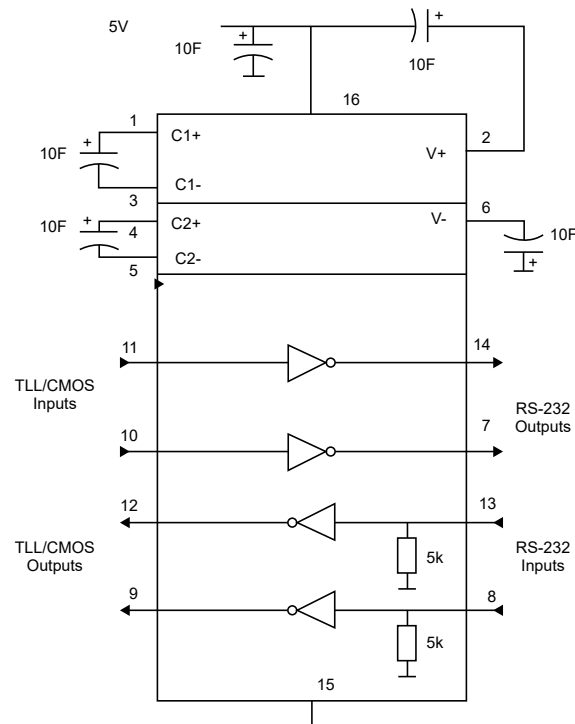
## 1. Description

The UMW MAX232E have two drives and two receivers. The drivers and receivers meet all EIA/TIA-232E and CCITT V.28 specifications at data rates up to 120 kbps when loaded in accordance with the EIA/TIA-232E specification

## 2. Features

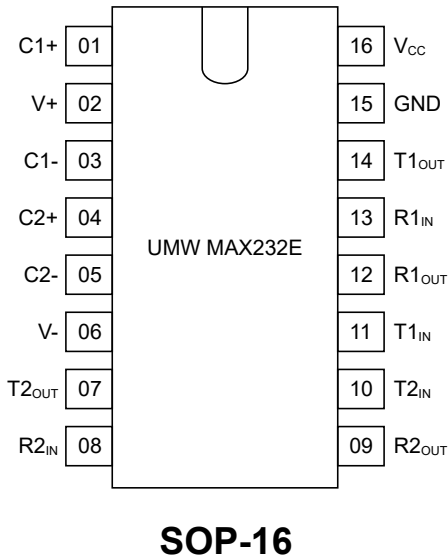
- Operate from Single +5 V Power Supply
- Guaranteed 120 kbps Data Rate
- Latchup Free
- ESD Protection  $\pm 2\text{kV}$

## 3. Typical Operating Circuit





4.Pinning Information



| Pin No | Symbol            | Function                                                |
|--------|-------------------|---------------------------------------------------------|
| 01     | C1+               | Terminal for positive charge-pump capacitor             |
| 02     | V+                | +2 V <sub>CC</sub> 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 <sub>CC</sub> voltage generated by the charge-pump |
| 07     | T2 <sub>OUT</sub> | RS-232 Driver Output                                    |
| 08     | R2 <sub>IN</sub>  | RS-232 Receiver Input                                   |
| 09     | R2 <sub>OUT</sub> | RS-232 Receiver Output                                  |
| 10     | T2 <sub>IN</sub>  | RS-232 Driver Input                                     |
| 11     | T1 <sub>IN</sub>  | RS-232 Driver Input                                     |
| 12     | R1 <sub>OUT</sub> | RS-232 Receiver Output                                  |
| 13     | R1 <sub>IN</sub>  | RS-232 Receiver Input                                   |
| 14     | T1 <sub>OUT</sub> | RS-232 Driver Output                                    |
| 15     | GND               | Ground                                                  |
| 16     | V <sub>CC</sub>   | + 4.5 V to 5.5 V Supply Voltage Input                   |



## 5. Absolute Maximum Ratings

| Parameter                                    | Symbol     | Min          | Max          | Units |
|----------------------------------------------|------------|--------------|--------------|-------|
| Supply voltage                               | $V_{CC}$   | -0.3         | 6            | V     |
| Transmitter high output voltage              | $V_{+}$    | $V_{CC}-0.3$ | 14           |       |
| Transmitter low output voltage               | $V_{-}$    | -14          | +0.3         |       |
| Transmitter input voltage                    | $V_{TIN}$  | -0.3         | $V_{CC}+0.3$ |       |
| Receiver input voltage                       | $V_{RIN}$  | -30          | 30           |       |
| Output voltages (transmitters)               | $V_{TOUT}$ | $V_{-}-0.3$  | $V_{+}+0.3$  |       |
| Output voltages (receivers)                  | $V_{ROUT}$ | -0.3         | $V_{CC}+0.3$ |       |
| Power dissipation                            | $P_D$      | -            | -            | mW    |
| DIP - package (derate 10.53 mW/c above 70°C) |            | -            | 842          |       |
| So-package (derate 9.52 mW/C above 70°C)     |            | -            | 762          |       |
| Short-Circuit Duration ( $T_{OUT}$ )         | $I_{SC}$   | -            | Continuous   |       |
| Storage temperature                          | $T_{STG}$  | -60          | 150          | °C    |
| Operating voltage range                      | $T_A$      | -40          | 105          | °C    |



## 6. Electrical Characteristics

$V_{CC}=4.5V$  to  $5.5V$ ,  $C1-C4 = 1\mu F$ ;  $T_A = -40$  to  $+85^\circ C$  unless otherwise noted)

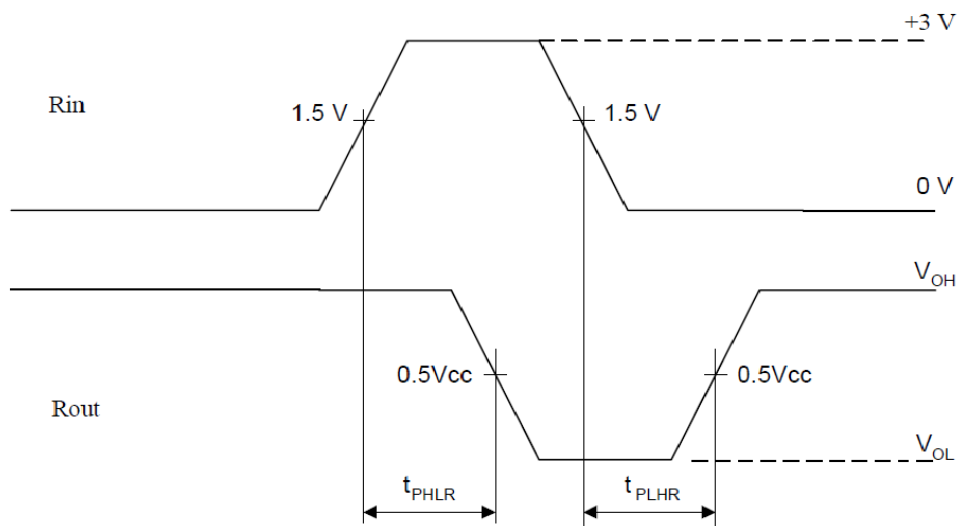
| Parameter                      | Symbol       | Conditions                                          | Min     | Max      | Units      |
|--------------------------------|--------------|-----------------------------------------------------|---------|----------|------------|
| <b>DC CHARACTERISTICS</b>      |              |                                                     |         |          |            |
| Operating Voltage Range        | $V_{CC}$     | $V_{IL}=0V$                                         | 4.5     | 5.5      | V          |
| $V_{CC}$ Supply Current        | $I_{CC}$     | No load, $T_A = 25^\circ C$                         |         | 10       | mA         |
| <b>LOGIC</b>                   |              |                                                     |         |          |            |
| Input Leakage Current          | $I_I$        | $T_{IN}=0V$ to $V_{CC}$                             | 0.2     | $\pm 10$ | $\mu A$    |
| Input Threshold Low            | $V_{IL}$     | $T_{IN}$                                            |         | 0.8      | V          |
| Input Threshold High           | $V_{IH}$     | $T_{IN}$                                            | 2       |          | V          |
| Output Voltage Low             | $V_{OL}$     | $R_{OUT}$ , $I_{OUT}=3.2mA$                         |         | 0.4      | V          |
| Output Voltage High            | $V_{OH}$     | $R_{OUT}$ , $I_{OUT}=-1mA$                          | 3.5     |          | V          |
| <b>RECEIVER INPUTS</b>         |              |                                                     |         |          |            |
| Input Voltage Range            | $V_{RIN}$    | All parts, normal operation                         | -30     | 30       | V          |
| Input Threshold Low            | $V_{ff}$     | $T_A=+25^\circ C$ , $V_{CC}=5V$                     | 0.8     |          | V          |
| Input Threshold High           | $I_{on}$     | $T_A=+25^\circ C$ , $V_{CC}=5V$                     |         | 2.4      | V          |
| Input Hysteresis               | $V_h$        | $V_{CC}=5V$                                         | 0.2     | 1        | V          |
| Input Resistance               | $R_I$        | $T_A=+25^\circ C$ , $V_{CC}=5V$                     | 3       | 7        | k $\Omega$ |
| <b>TRANSMITTER OUTPUTS</b>     |              |                                                     |         |          |            |
| Output Voltage Swing           | $\Delta V_O$ | All driver inputs loaded with 3k $\Omega$ to ground | $\pm 5$ |          | V          |
| Output resistance              | $R_O$        | $V_{CC}=V+=V-=0V$ , $V_{OUT}=+2V$                   | 300     |          | $\Omega$   |
| Output Short - Circuit Current | $I_{SC}$     |                                                     |         | $\pm 60$ | mA         |



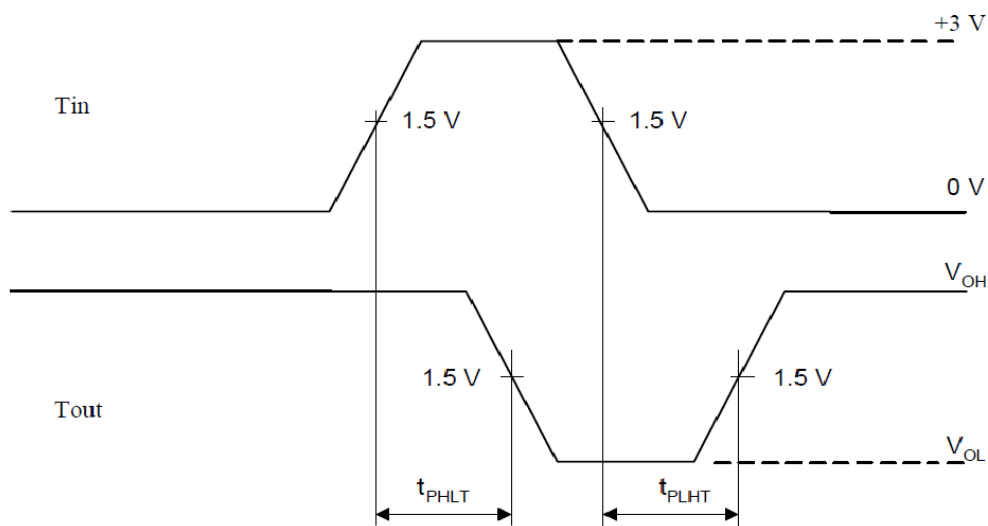
| Parameter                     | Symbol                   | Conditions                                                                                                                                   | Min | Max | Units      |
|-------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------------|
| <b>TIMING CHARACTERISTICS</b> |                          |                                                                                                                                              |     |     |            |
| Maximum Data Rate             | ST                       | $R_L=3k\Omega$ to 7 k $\Omega$<br>$C_L=50pF$ to 1000pF<br>onetransmitter switching                                                           | 120 |     | kbps       |
| Reseiver Propagation Delay    | $t_{PLHR}$<br>$t_{PHLR}$ | $C_L=150pF$<br>All parts, normal operation(Fig. 1)                                                                                           |     | 10  | $\mu S$    |
| Transmitter Propagation Delay | $t_{PLHT}$<br>$t_{PHLT}$ | $R_L=3k\Omega$ , $C_L=2500pF$<br>all transmitters loaded (Fig.2)                                                                             |     | 6   | $\mu S$    |
| Transition-Region Slew Rate   | SR                       | $T_A=25^\circ C$ , $V_{CC}=5V$<br>$R_L=3k\Omega$ to 7 k $\Omega$<br>$C_L=50pF$ to 2500pF<br>measured from _3V to +3V<br>or +3V to -3V(Fig.3) | 3   | 30  | V/ $\mu S$ |



## 7. Timing Diagram



**Figure 1**



**Figure 2**

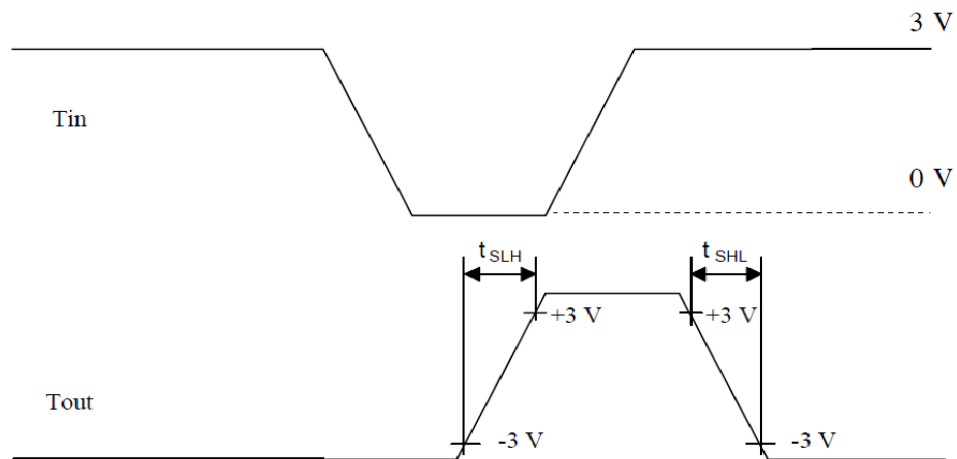
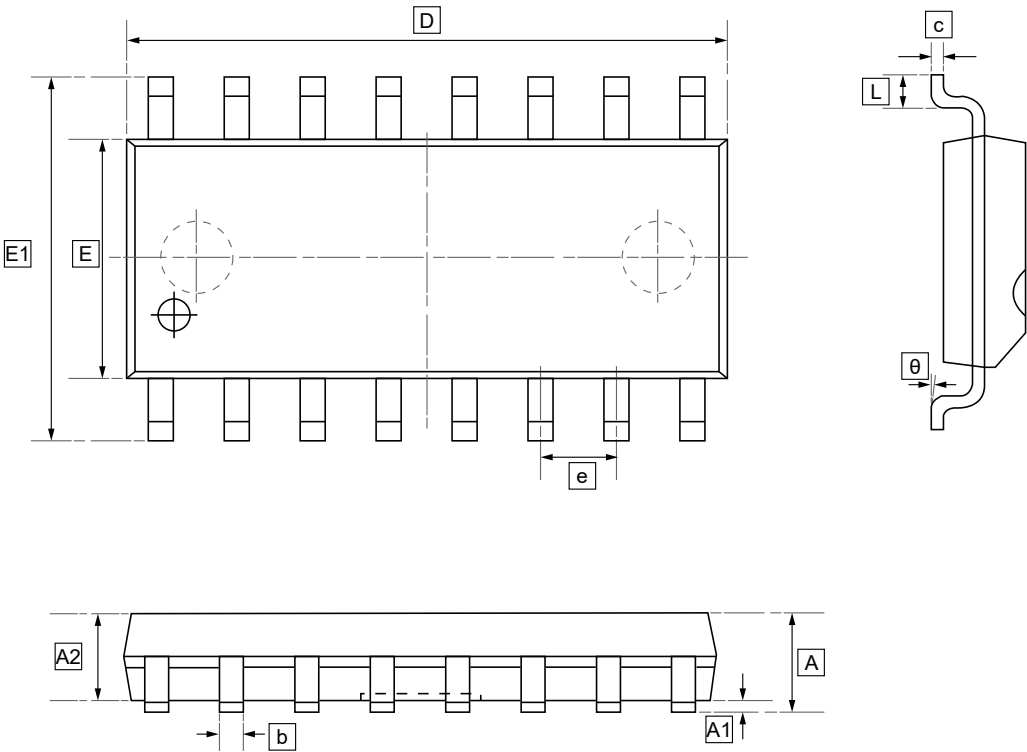


Figure 3



8.SOP-16 Package Outline Dimensions

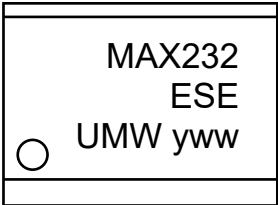


DIMENSIONS (mm are the original dimensions)

| Symbol | A     | A1    | A2    | b     | c     | D      | E     | E1    | e     | L     | θ  |
|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|----|
| Min    | 1.350 | 0     | 1.350 | 0.330 | 0.170 | 9.800  | 3.800 | 5.800 | 1.270 | 0.400 | 0° |
| Max    | 1.750 | 0.100 | 1.550 | 0.510 | 0.250 | 10.200 | 4.000 | 6.200 | BSC   | 1.270 | 8° |



9.Ordering information



yww: Batch Code

| Order Code    | Package | Base QTY | Delivery Mode |
|---------------|---------|----------|---------------|
| UMW MAX232ESE | SOP-16  | 2500     | Tape and reel |



## **10.Disclaimer**

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