

General Description

The MAX3232CSE consists of two drivers, two receivers, and a dual charge-pump circuit with $\pm 12\text{kV}$ IEC 61000-4-2 Contact Discharge ESD protection.

The MAX3232CSE meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector. The charge pump and four small external capacitors allow operation from a single 3V to 5.5V supply. The device operates at data signaling rates up to 250 kbps.

The MAX3232CSE is available in SOP16 package.

Features

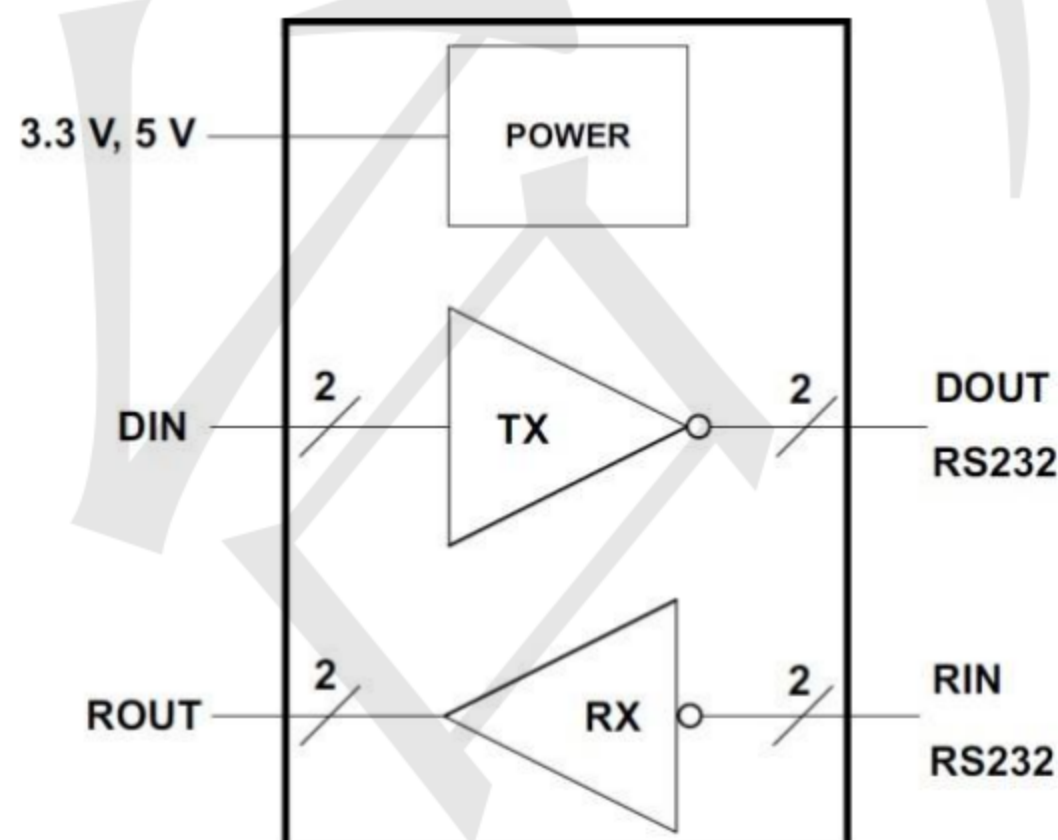
- ESD protection for RS-232 Bus Pins
 - $\pm 12\text{kV}$ (IEC61000-4-2, Contact Discharge)
 - $\pm 15\text{kV}$ (IEC61000-4-2, Air-Gap Discharge)
- Meets the Requirements of TIA/EIA-232-F standard
- Wide Power Supply Range: Single +3V to +5.5V
- Operates up to 250kbps
- Two Drivers and Two Receivers
- External Capacitors: $4 \times 0.1 \mu\text{F}$
- Accepts 5V Logic Input With 3.3V Supply

Applications

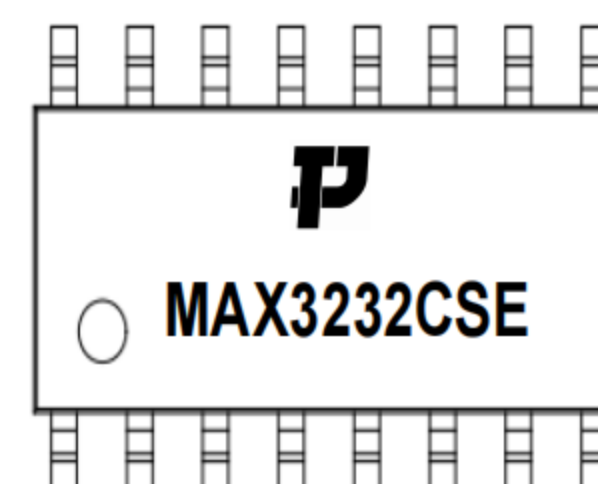
- Battery-Powered Equipment
- Industry Human Machine Interface
- Notebook, Computers
- Printers

Mechanical Characteristics

- Shipping Qty :2.5kpcs Or 4k pcs 7Inch Tape & Reel



Marking



Absolute Maximum Ratings

| Characteristic | | Min | Max | Unit | |
|---------------------------------|--|-----------|-------|-----------------------|---|
| V _{CC} | Supply voltage | -0.3 | 6 | V | |
| V ₊ | Positive output supply voltage | -0.3 | 7 | V | |
| V ₋ | Negative output supply voltage | 0.3 | -7 | V | |
| V ₊ - V ₋ | Supply voltage difference | | 13 | V | |
| V _I | Input voltage | Drivers | -0.3 | 6 | V |
| | | Receivers | -25 | 25 | V |
| V _O | Output voltage | Drivers | -13.2 | 13.2 | V |
| | | Receivers | -0.3 | V _{CC} + 0.3 | V |
| T _J | Operating virtual junction temperature | | 150 | °C | |
| T _{stg} | Storage temperature | -65 | 150 | °C | |

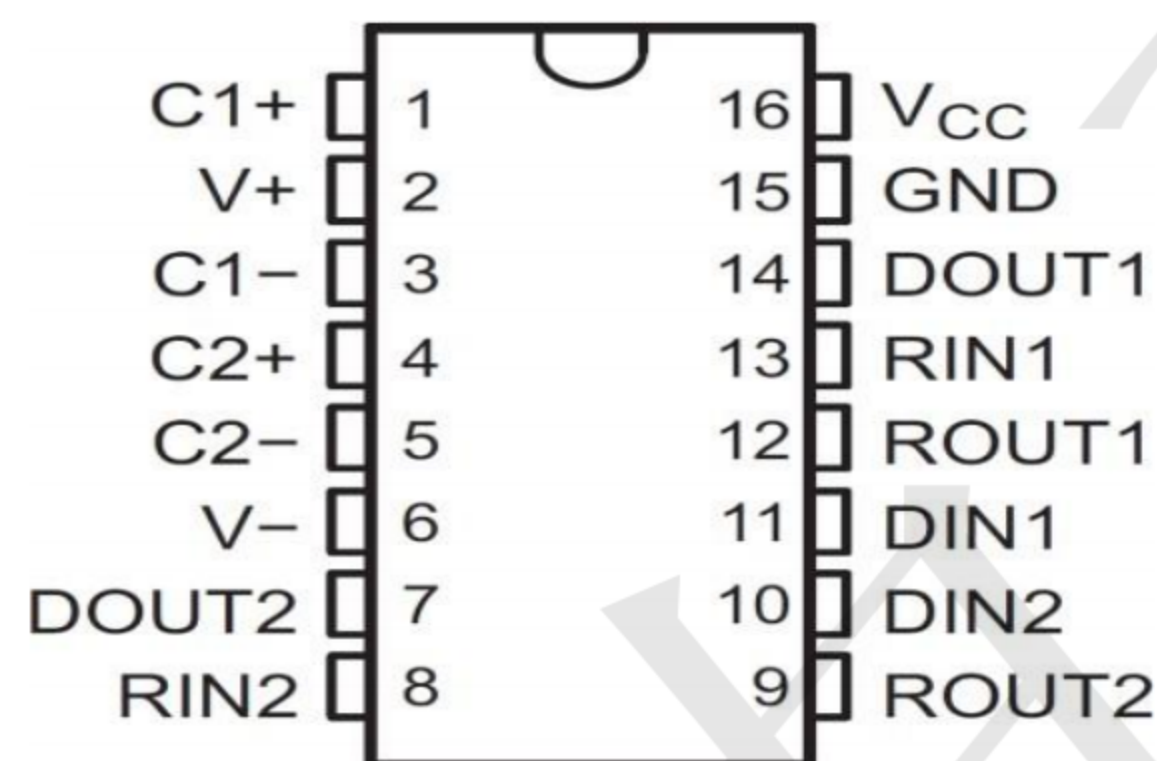
Recommended Operating Conditions

| Characteristic | | Min | Typ | Max | Unit |
|-----------------|---------------------------------|------------------------|------------------------|-----|------|
| Supply voltage | | V _{CC} = 3.3V | 3 | 3.3 | V |
| | | V _{CC} = 5V | 4.5 | 5 | |
| V _{IH} | Driver high-level input voltage | DIN | V _{CC} = 3.3V | | 5.5 |
| | | | V _{CC} = 5V | 2.4 | 5.5 |
| V _{IL} | Driver low-level input | DIN | 0 | 0.8 | V |
| V _I | Receiver input voltage | RIN | -25 | 25 | V |
| T _A | Operating free-air temperature | | -40 | 125 | °C |

Electrical Characteristics

| Parameter | | Test Conditions | Min | Typ | Max | Unit |
|------------------|---|--|----------------------|----------------------|-----|------|
| I _{CC} | Supply current | No load, V _{CC} = 3.3 V or 5 V | | 1.5 | | mA |
| Driver | | | | | | |
| V _{OH} | High-level output voltage | DOUT at R _L = 3 kΩ to GND, DIN = GND | 5 | 5.4 | | V |
| V _{OL} | Low-level output voltage | DOUT at R _L = 3 kΩ to GND, DIN = V _{CC} | -5 | -5.4 | | V |
| I _{IH} | High-level input current | V _I = V _{CC} | | ±0.01 | ±1 | μA |
| I _{IL} | Low-level input current | V _I at GND | | ±0.01 | ±1 | μA |
| I _{OS} | Short-circuit output current | V _{CC} = 3.6 V, V _O = 0 V | | ±30 | ±60 | mA |
| | | V _{CC} = 5.5 V, V _O = 0 V | | | | |
| r _O | Output resistance | V _{CC} , V ₊ , and V ₋ = 0 V, V _O = ±2 V | 300 | 10M | | Ω |
| Receiver | | | | | | |
| V _{OH} | High-level output voltage | I _{OH} = -1 mA | V _{CC} -0.6 | V _{CC} -0.1 | | V |
| V _{OL} | Low-level output voltage | I _{OL} = 1.6 mA | | | 0.4 | V |
| V _{IT+} | Positive-going input threshold voltage | V _{CC} = 3.3 V | | 1.5 | 2.4 | V |
| | | V _{CC} = 5 V | | 2.0 | 2.4 | |
| V _{IT-} | Negative-going input threshold voltage | V _{CC} = 3.3 V | 0.6 | 1.1 | | V |
| | | V _{CC} = 5 V | 0.8 | 1.5 | | |
| V _{hys} | Input hysteresis (V _{IT+} - V _{IT-}) | | | 0.4 | | V |
| r _i | Input resistance | V _I = ±3 V to ±25 V | 3 | 5 | 7 | kΩ |

Pin Configuration and Functions



| Pin NO. | Name | I/O | Description |
|---------|-------|-----|--|
| 1 | C1+ | — | Positive lead of C1 capacitor |
| 2 | V+ | O | Positive charge pump output for storage capacitor only |
| 3 | C1- | — | Negative lead of C1 capacitor |
| 4 | C2+ | — | Positive lead of C2 capacitor |
| 5 | C2- | — | Negative lead of C2 capacitor |
| 6 | V- | O | Negative charge pump output for storage capacitor only |
| 7 | DOUT2 | O | RS232 Driver Output |
| 8 | RIN2 | I | RS232 Receiver Input |
| 9 | ROUT2 | O | TTL/CMOS Receiver Output |
| 10 | DIN2 | I | TTL/CMOS Driver Input |
| 11 | DIN1 | I | TTL/CMOS Driver Input |
| 12 | ROUT1 | O | TTL/CMOS Receiver Output |
| 13 | RIN1 | I | RS232 Receiver Input |
| 14 | DOUT1 | O | RS232 Driver Output |
| 15 | GND | — | Ground |
| 16 | VCC | — | Supply Voltage |

Switchin Characteristics

| Parameter | | Test Conditions | Min | Typ | Max | Unit |
|-------------------|--|---|---|-----|-----|------------|
| Maximum data rate | | $R_L = 3\text{ k}\Omega$, $C_L = 1000\text{ pF}$, One DOUT switching | 250 | | | kbps |
| $t_{sk(p)}$ | Driver pulse skew | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, $C_L = 150\text{ pF}$ to 2500 pF , see Figure 1 | | 100 | | ns |
| $SR(tr)$ | Driver slew rate, transition region | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, $V_{CC} = 3.3\text{ V}$ | $C_L = 150\text{ pF}$ to 1000 pF | 6 | 30 | V/ μ s |
| | | | $C_L = 150\text{ pF}$ to 2500 pF | 4 | 30 | |
| t_{PLH} | Receiver propagation delay time, low- to high-level output | $C_L = 150\text{ pF}$ see Figure 2 | | 150 | | ns |
| t_{PHL} | Receiver propagation delay time, high- to low-level output | | | 150 | | ns |
| $t_{sk(p)}$ | Receiver pulse skew | | | 60 | | ns |

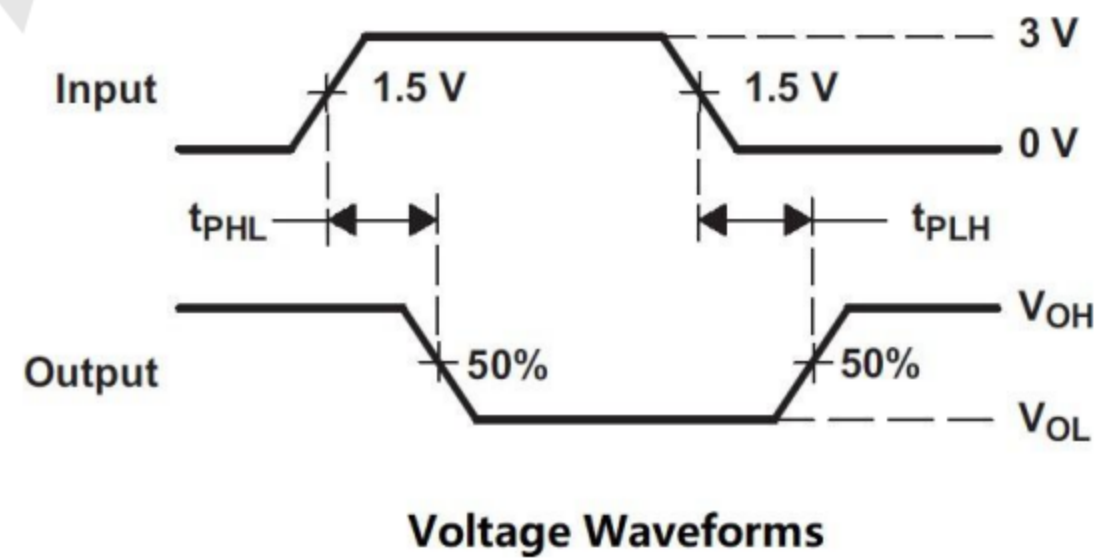
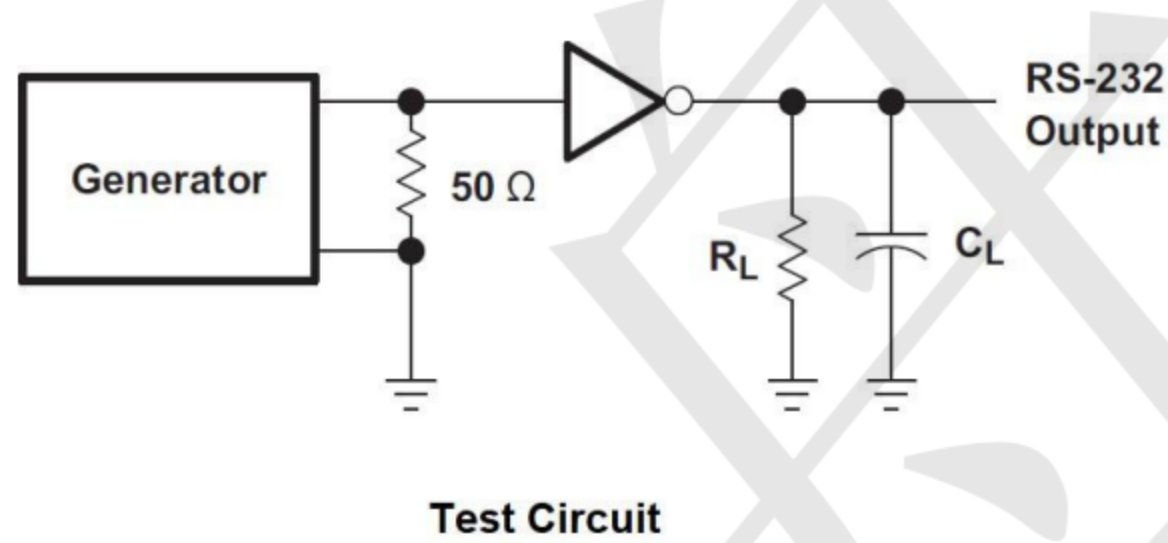


Figure 1. Driver Pulse Skew

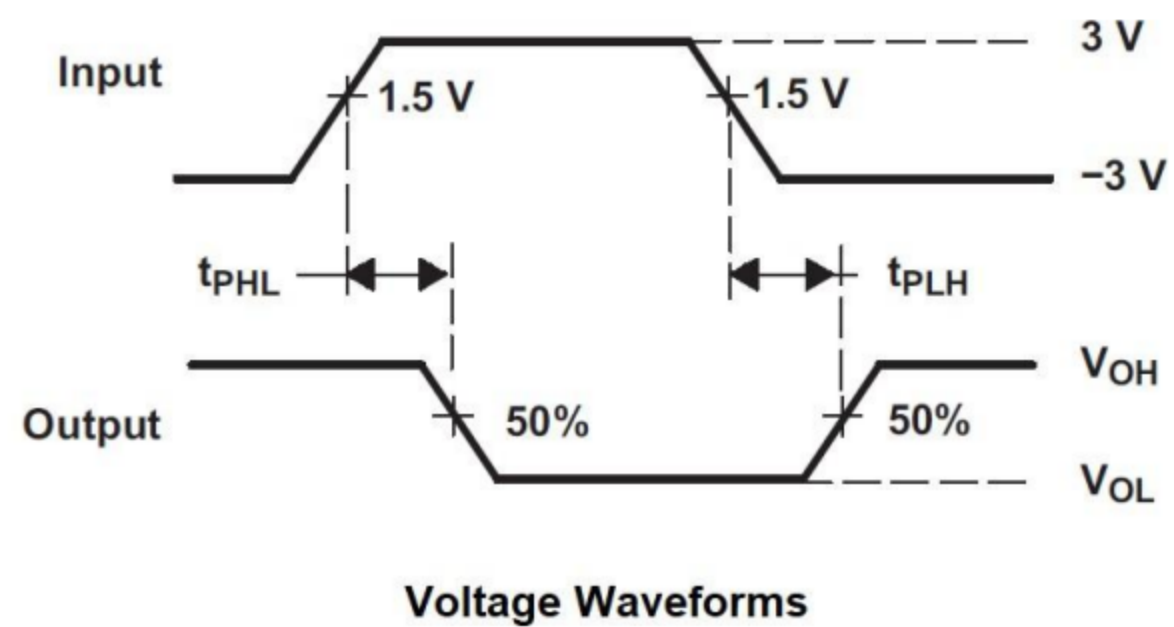
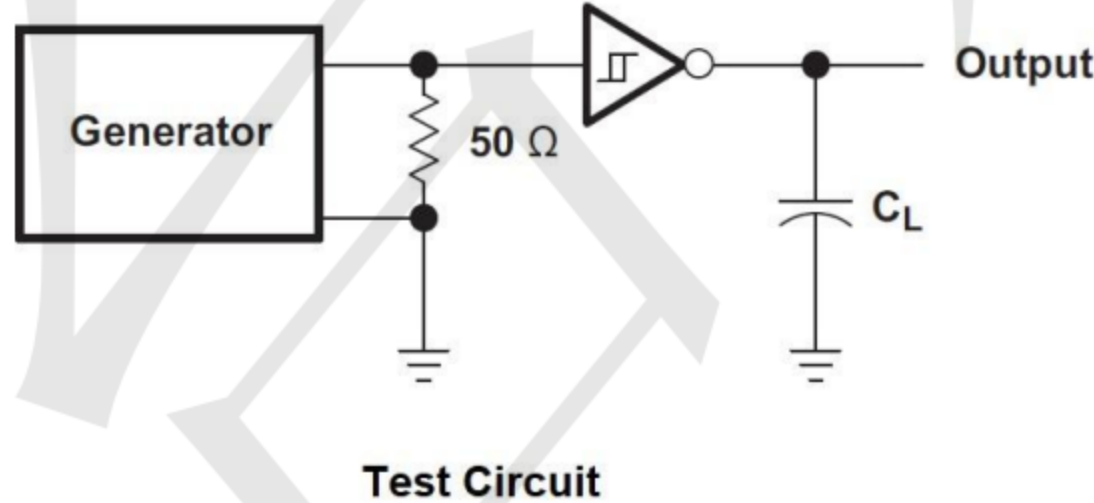
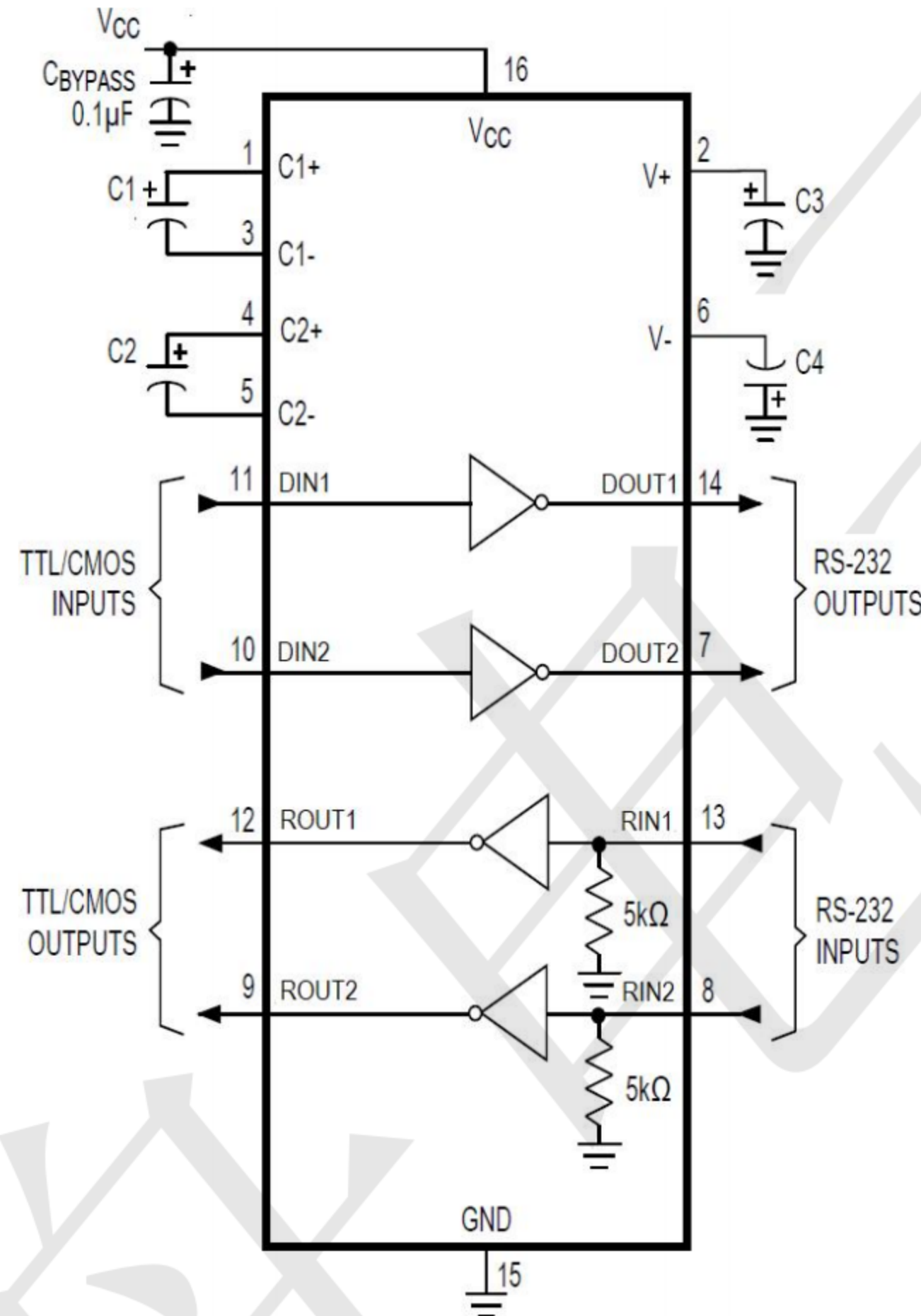


Figure 2. Receiver Propagation Delay Times

Typical Application

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Nonpolarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used, they should be connected as shown.

Figure 3. Typical Operating Circuit

Table 1. VCC vs Capacitor Values

| VCC | C1 | C2, C3, C4 |
|---------------|----------|------------|
| 3.3 V ± 0.3 V | 0.1 µF | 0.1 µF |
| 5 V ± 0.5 V | 0.047 µF | 0.33 µF |
| 3 V to 5.5 V | 0.1 µF | 0.47 µF |



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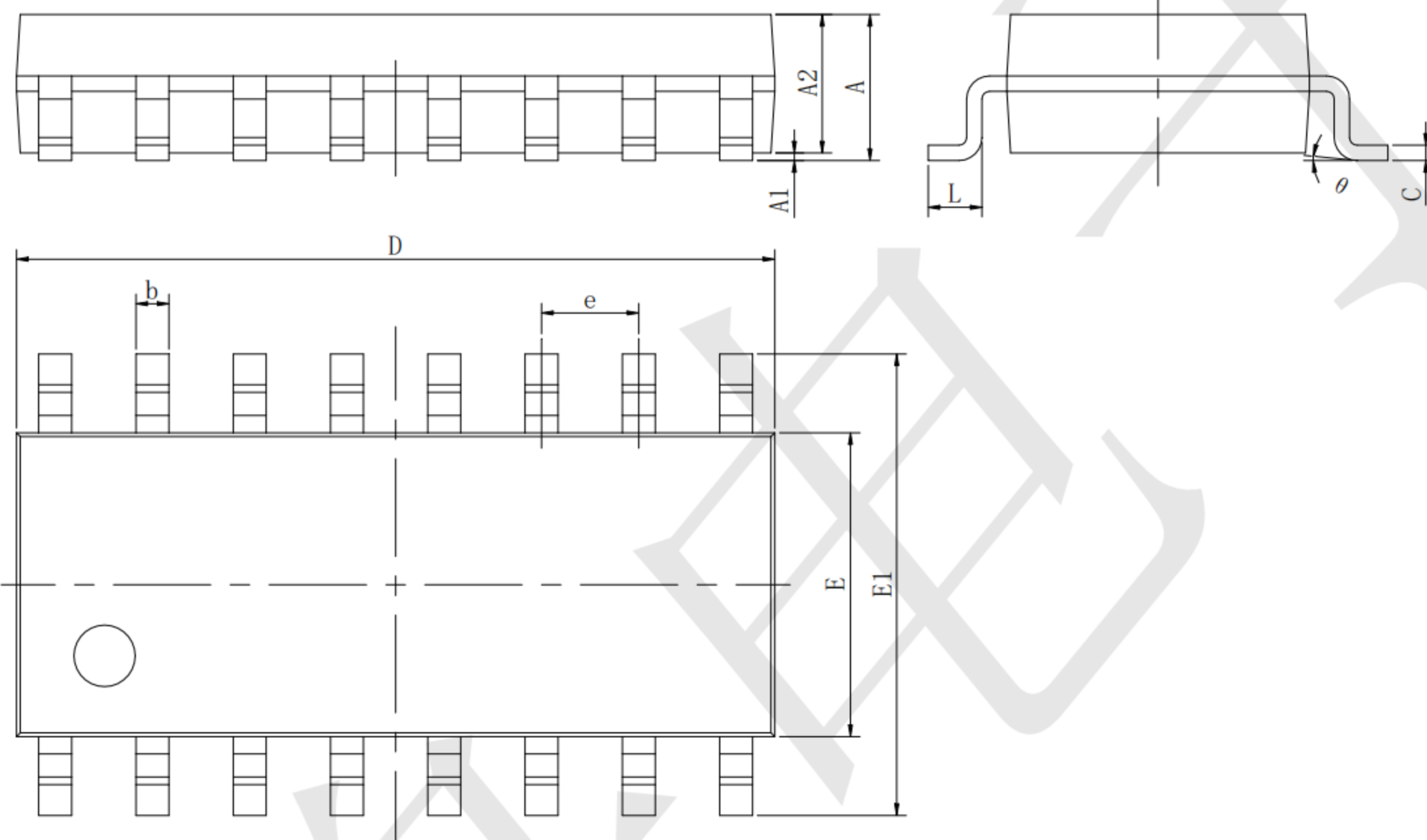
MAX3232CSE

3V to 5.5V 250kbps RS-232 Transceivers

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Outline Dimensions SOP16

Unit:mm



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 9.800 | 10.200 | 0.386 | 0.402 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| theta | 0° | 8° | 0° | 8° |