# MAX200–MAX209/ MAX211/MAX213

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

## General Description

The MAX200–MAX209/MAX211/MAX213 transceivers are designed for RS-232 and V.28 communication interfaces where ±12V supplies are not available. On-board charge pumps convert the +5V input to the ±10V needed for RS-232 output levels. The MAX201 and MAX209 operate from +5V and +12V, respectively, and contain a +12V to -12V charge-pump voltage converter.

The MAX200–MAX209/MAX211/MAX213 drivers and receivers meet all EIA/TIA-232E and CCITT V.28 specifications at a 20kbps data rate. The drivers maintain the ±5V EIA/TIA-232E output signal levels at data rates in excess of 120kbps when loaded in accordance with the EIA/TIA-232E specification.

The 5µW shutdown mode of the MAX200, MAX205, MAX206, and MAX211 conserves energy in battery-powered systems. The MAX213 has an active-low shutdown and an active-high receiver enable control. Two receivers of the MAX213 are active, allowing the ring indicator (RI) to be monitored easily using only 75µW power.

The MAX211 and MAX213 are available in a 28-pin, wide small-outline (SO) package and a 28-pin shrink small-outline (SSOP) package, which occupies only 40% of the area of the SO. The MAX207 is now available in a 24-pin SO package and a 24-pin SSOP. The MAX203 and MAX205 use no external components and are recommended for applications with limited circuit board space.

***Ordering Information appears at end of data sheet.***

## Next-Generation Device Features

- **For Low-Cost Applications:**
  **MAX221E: ±15kV ESD-Protected, +5V, 1µA, Single RS-232 Transceiver with AutoShutdown™**
- **For Low-Voltage and Space-Constrained Applications:**
  **MAX3222E/MAX3232E/MAX3237E/MAX3241E/ MAX3246E: ±15kV ESD-Protected, Down to 10nA, +3.0V to +5.5V, Up to 1Mbps, True RS-232 Transceivers (MAX3246E Available in UCSP™ Package)**
- **For Space-Constrained Applications:**
  **MAX3228E/MAX3229E: ±15kV ESD-Protected, +2.5V to +5.5V, RS-232 Transceivers in UCSP**
- **For Low-Voltage or Data Cable Applications:**
  **MAX3380E/MAX3381E: +2.35V to +5.5V, 1µA, 2Tx/2Rx RS-232 Transceivers with ±15kV ESD-Protected I/O and Logic Pins**
- **For Low-Power Applications:**
  **MAX3224E–MAX3227E/MAX3244E/MAX3245E: ±15kV ESD-Protected, 1µA, 1Mbps, +3.0V to +5.5V, RS-232 Transceivers with AutoShutdown Plus™**

## Applications

Computers: Laptops, Palmtops, Notebooks

Battery-Powered Equipment

Handheld Equipment

## Selector Guide

| PART | POWER-SUPPLY VOLTAGE (V) | NUMBER OF RS-232 DRIVERS | NUMBER OF RS-232 RECEIVERS | NUMBER OF RECEIVERS ACTIVE IN SHUTDOWN | NUMBER OF EXTERNAL CAPACITORS (0.1µF) | LOW-POWER SHUTDOWN/TTL THREE-STATE |
|---|---|---|---|---|---|---|
| MAX200 | +5 | 5 | 0 | 0 | 4 | Yes/No |
| MAX201 | +5 and +9.0 to +13.2 | 2 | 2 | 0 | 2 | No/No |
| MAX202 | +5 | 2 | 2 | 0 | 4 | No/No |
| MAX203 | +5 | 2 | 2 | 0 | None | No/No |
| MAX204 | +5 | 4 | 0 | 0 | 4 | No/No |
| MAX205 | +5 | 5 | 5 | 0 | None | Yes/Yes |
| MAX206 | +5 | 4 | 3 | 0 | 4 | Yes/Yes |
| MAX207 | +5 | 5 | 3 | 0 | 4 | No/No |
| MAX208 | +5 | 4 | 4 | 0 | 4 | No/No |
| MAX209 | +5 and +9.0 to +13.2 | 3 | 5 | 0 | 2 | No/Yes |
| MAX211 | +5 | 4 | 5 | 0 | 4 | Yes/Yes |
| MAX213 | +5 | 4 | 5 | 2 | 4 | Yes/Yes |

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

## ABSOLUTE MAXIMUM RATINGS

$V_{CC}$ ........................................................................ -0.3V to +6V
V+ ........................................................... ($V_{CC}$ - 0.3V) to +14V
V- ......................................................................... +0.3V to -14V
Input Voltages
  $T_{IN}$ ....................................................... -0.3V to ($V_{CC}$ + 0.3V)
  $R_{IN}$ ................................................................................. ±30V
Output Voltages
  $T_{OUT}$ ................................................ (V+ + 0.3V) to (V- - 0.3V)
  $R_{OUT}$ ................................................... -0.3V to ($V_{CC}$ + 0.3V)
Short-Circuit Duration
  $T_{OUT}$ ..................................................................... Continuous
Continuous Power Dissipation ($T_A$ = +70°C)
  14-Pin Plastic DIP (derate 10.00mW/°C above +70°C)... 800mW
  16-Pin Plastic DIP (derate 10.53mW/°C above +70°C)... 842mW
  16-Pin SO (derate 8.70mW/°C above +70°C) ............ 696mW
  16-Pin Wide SO (derate 9.52mW/°C above +70°C) .... 762mW
  16-Pin CERDIP (derate 10.00mW/°C above +70°C) ... 800mW
  20-Pin Plastic DIP (derate 11.11mW/°C above +70°C)... 889mW
  20-Pin Wide SO (derate 10.00mW/°C above +70°C).. 800mW
  20-Pin CERDIP (derate 11.11mW/°C above +70°C) ... 889mW
  24-Pin Narrow Plastic DIP
    (derate 13.33mW/°C above +70°C) ...................... 1067mW
  24-Pin Wide Plastic DIP
    (derate 9.09mW/°C above +70°C) .......................... 727mW
  24-Pin Wide SO (derate 11.76mW/°C above +70°C).. 941mW
  24-Pin SSOP (derate 8.00mW/°C above +70°C)......... 640mW
  24-Pin CERDIP (derate 12.50mW/°C above +70°C) . 1000mW
  28-Pin Wide SO (derate 12.50mW/°C above +70°C) 1000mW
  28-Pin SSOP (derate 9.52mW/°C above +70°C)......... 762mW
Operating Temperature Ranges
  MAX2_ _C_ _...................................................... 0°C to +70°C
  MAX2_ _E_ _ .................................................. -40°C to +85°C
  MAX2_ _ M_ _ .............................................. -55°C to +125°C
Storage Temperature Range........................... -65°C to +160°C
Lead Temperature (soldering, 10s) (Note 1) ................. +300°C

**Note 1:** Maximum reflow temperature for the MAX203 and MAX205 is +225°C.

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

## ELECTRICAL CHARACTERISTICS

(MAX202/MAX204/MAX206/MAX208/MAX211/MAX213: $V_{CC}$ = +5V ±10%; MAX200/MAX203/MAX205/MAX207: $V_{CC}$ = +5V ±5%, C1–C4 = 0.1µF; MAX201/MAX209: $V_{CC}$ = +5V ±10%, V+ = +9.0V to +13.2V, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted.)

| PARAMETER | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Output-Voltage Swing | All transmitter outputs loaded with 3kΩ to ground | | ±5 | ±8 | | V |
| $V_{CC}$ Power-Supply Current | No load, $T_A$ = +25°C | MAX202, MAX203 | | 8 | 15 | mA |
| | | MAX200, MAX204–MAX208, MAX211, MAX213 | | 11 | 20 | |
| | | MAX201, MAX209 | | 0.4 | 1 | |
| V+ Power-Supply Current | No load | MAX201 | | 5 | 10 | mA |
| | | MAX209 | | 7 | 15 | |
| Shutdown Supply Current | Figure 1, $T_A$ = +25°C | MAX200, MAX205, MAX206, MAX211 | | 1 | 10 | µA |
| | | MAX213 | | 15 | 50 | |
| Input Logic Threshold Low | $T_{IN}$, $\overline{EN}$, SHDN, EN, $\overline{SHDN}$ | | | | 0.8 | V |
| Input Logic Threshold High | $T_{IN}$ | | 2.0 | | | V |
| | $\overline{EN}$, SHDN, EN, $\overline{SHDN}$ | | 2.4 | | | |
| Logic Pullup Current | $T_{IN}$ = 0V | | | 15 | 200 | µA |
| RS-232 Input-Voltage Operating Range | | | -30 | | +30 | V |

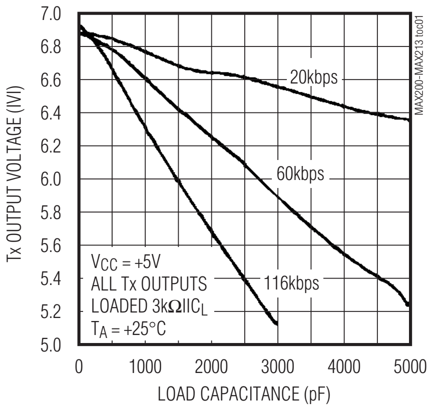
### ELECTRICAL CHARACTERISTICS (continued)

(MAX202/MAX204/MAX206/MAX208/MAX211/MAX213: $V_{CC}$ = +5V ±10%; MAX200/MAX203/MAX205/MAX207: $V_{CC}$ = +5V ±5%, C1–C4 = 0.1μF; MAX201/MAX209: $V_{CC}$ = +5V ±10%, V+ = +9.0V to +13.2V, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted.)

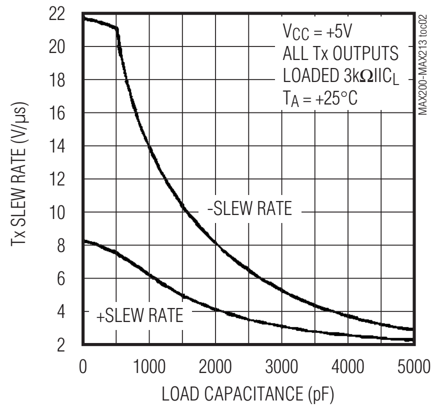
| PARAMETER | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Receiver Input Threshold Low | $V_{CC}$ = +5V, $T_A$ = +25°C | Active mode | 0.8 | 1.2 | | V |
| | | Shutdown mode, MAX213, R4, R5 | 0.6 | 1.5 | | |
| Receiver Input Threshold High | $V_{CC}$ = +5V, $T_A$ = +25°C | Active mode | | 1.7 | 2.4 | V |
| | | Shutdown mode, MAX213, R4, R5 | | 1.5 | 2.4 | |
| RS-232 Input Hysteresis | $V_{CC}$ = +5V, no hysteresis in shutdown | | 0.2 | 0.5 | 1.0 | V |
| RS-232 Input Resistance | $V_{CC}$ = +5V, $T_A$ = +25°C | | 3 | 5 | 7 | kΩ |
| TTL/CMOS Output-Voltage Low | $I_{OUT}$ = 3.2mA | MAX201, MAX202, MAX203 | | | 0.4 | V |
| | $I_{OUT}$ = 1.6mA | All others | | | | |
| TTL/CMOS Output-Voltage High | $I_{OUT}$ = 1.0mA | | 3.5 | | | V |
| TTL/CMOS Output Leakage Current | $\overline{EN}$ = $V_{CC}$, EN = 0V, 0 ≤ $R_{OUT}$ ≤ $V_{CC}$ | | | 0.05 | ±10 | μA |
| Output Enable Time | Figure 2 | MAX205, MAX206, MAX209, MAX211, MAX213 | | 600 | | ns |
| Output Disable Time | Figure 2 | MAX205, MAX206, MAX209, MAX211, MAX213 | | 200 | | ns |
| Receiver Propagation Delay | $\overline{SHDN}$ = 0V, R4, R5 | MAX213 | | 4 | 40 | μs |
| | $\overline{SHDN}$ = $V_{CC}$ | MAX213 | | 0.5 | 10 | |
| | MAX200–MAX211 | | | 0.5 | 10 | |
| Transmitter Output Resistance | $V_{CC}$ = V+ = V- = 0V, $V_{OUT}$ = ±2V | | 300 | | | Ω |
| Transition Region Slew Rate | $C_L$ = 50pF to 2500pF, $R_L$ = 3kΩ to 7kΩ, $V_{CC}$ = 5V, $T_A$ = +25°C measured from +3V to -3V or -3V to +3V | MAX200, MAX202–MAX211, MAX213 | 3 | 5.5 | 30 | V/μs |
| | | MAX201 | | 4 | 30 | |
| RS-232 Output Short-Circuit Current | | | | ±10 | ±60 | mA |
| Maximum Data Rate | $R_L$ = 3kΩ to 7kΩ, $C_L$ = 50pF to 1000pF, one transmitter | | 120 | | | kbps |

### Typical Operating Characteristics

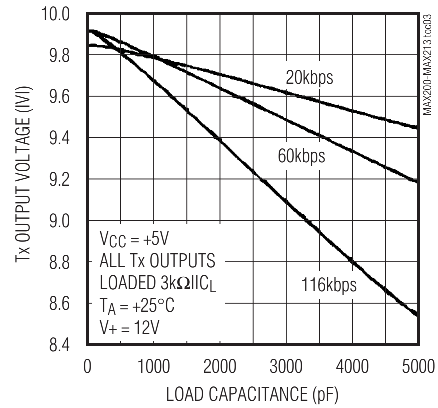
**MAX200/204/205/206/207/208/211/213 TRANSMITTER OUTPUT VOLTAGE vs. LOAD CAPACITANCE**



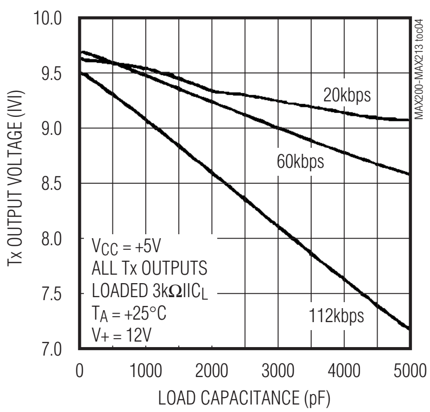

**MAX200/204/205/206/207/208/211/213 TRANSMITTER SKEW RATE vs. LOAD CAPACITANCE**



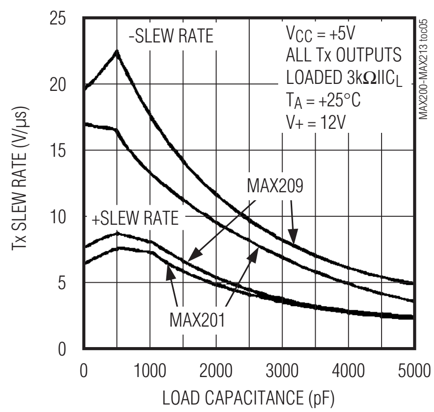

**MAX209 TRANSMITTER OUTPUT VOLTAGE vs. LOAD CAPACITANCE**



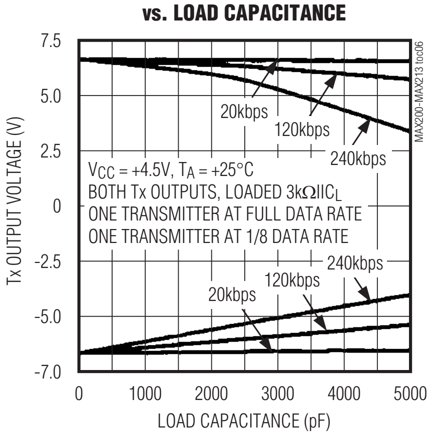

**MAX201 TRANSMITTER OUTPUT VOLTAGE vs. LOAD CAPACITANCE**



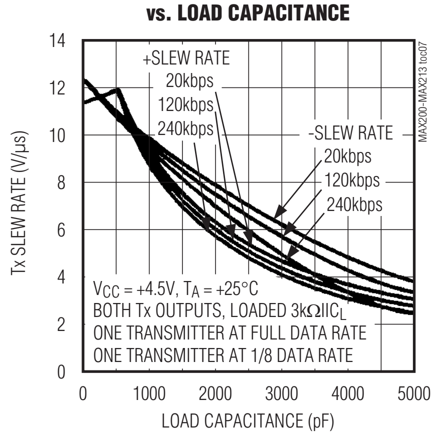

**MAX201/MAX209 TRANSMITTER SLEW RATE vs. LOAD CAPACITANCE**



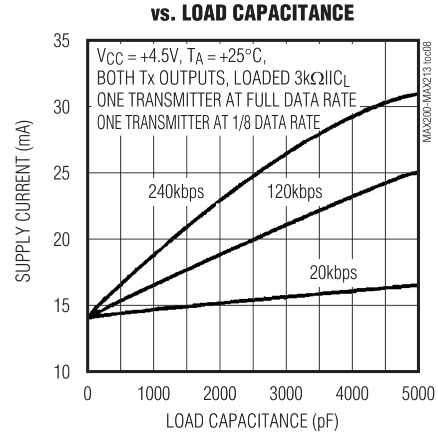

**MAX202/203 TRANSMITTER OUTPUT VOLTAGE vs. LOAD CAPACITANCE**




**MAX202/203 TRANSMITTER SLEW RATE vs. LOAD CAPACITANCE**




**MAX202/203 SUPPLY CURRENT vs. LOAD CAPACITANCE**



# +5V, RS-232 Transceivers with 0.1μF External Capacitors

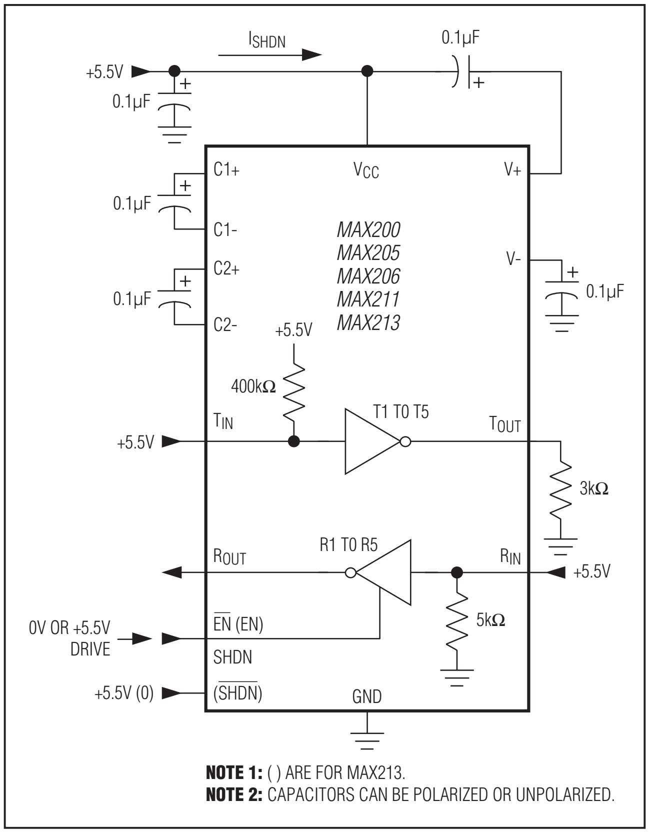



*Figure 1. Shutdown Current Test Circuit*

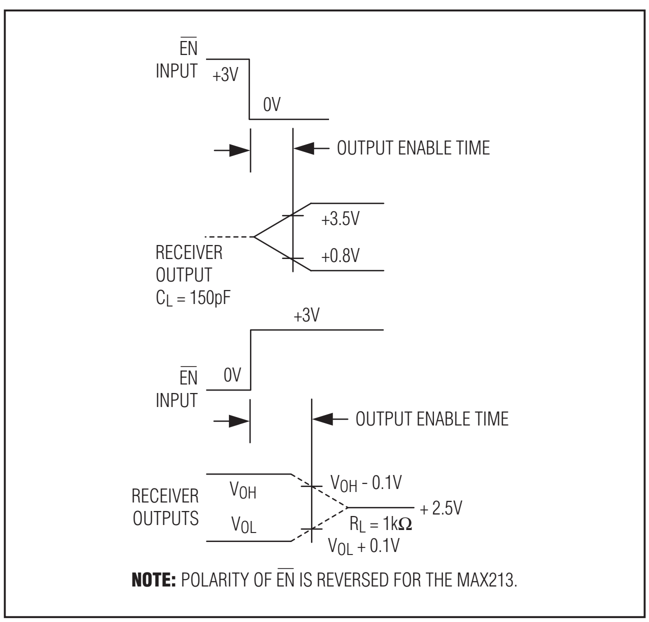



*Figure 2. Receiver Output Enable and Disable Timing*

## Detailed Description

The MAX200–MAX209/MAX211/MAX213 consist of three sections: charge-pump voltage converters, drivers (transmitters), and receivers. Each section is described in detail.

### +5V to ±10V Dual Charge-Pump Voltage Converter

The +5V to ±10V conversion is performed by two charge-pump voltage converters (Figure 4). The first uses capacitor C1 to double +5V to +10V, storing +10V on the V+ output filter capacitor, C3. The second charge-pump voltage converter uses capacitor C2 to invert +10V to -10V, storing -10V on the V- output filter capacitor, C4.

The MAX201 and MAX209 include only the V+ to V- charge pump, and are intended for applications that have a $V_{CC}$ = +5V supply and a V+ supply in the +9V to +13.2V range.

In shutdown mode, V+ is internally connected to $V_{CC}$ by a 1kΩ pulldown resistor and V- is internally connected to ground by a 1kΩ pullup resistor.

### RS-232 Drivers

When $V_{CC}$ = +5V, the typical driver output-voltage swing is ±8V when loaded with a nominal 5kΩ RS-232 receiver. The output swing is guaranteed to meet the EIA/TIA-232E and V.28 specifications, which call for ±5V minimum output levels under worst-case conditions. These include a minimum 3kΩ load, $V_{CC}$ = +4.5V, and the maximum operating temperature. The open-circuit output-voltage swing ranges from (V+ - 0.6V) to V-.

Input thresholds are both CMOS and TTL compatible. The inputs of unused drivers can be left unconnected since 400kΩ pullup resistors to $V_{CC}$ are included on-chip. Since all drivers invert, the pullup resistors force the outputs of unused drivers low. The input pullup resistors typically source 15μA; therefore, the driver inputs should be driven high or open circuited to minimize power-supply current in shutdown mode.

When in low-power shutdown mode, the driver outputs are turned off and their leakage current is less than 1mA, even if the transmitter output is backdriven between 0V and ($V_{CC}$ + 6V). Below -0.5V, the transmitter output is diode clamped to ground with a 1kΩ series impedance. The transmitter output is also zener clamped to approximately ($V_{CC}$ + 6V), with a 1kΩ series impedance.

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

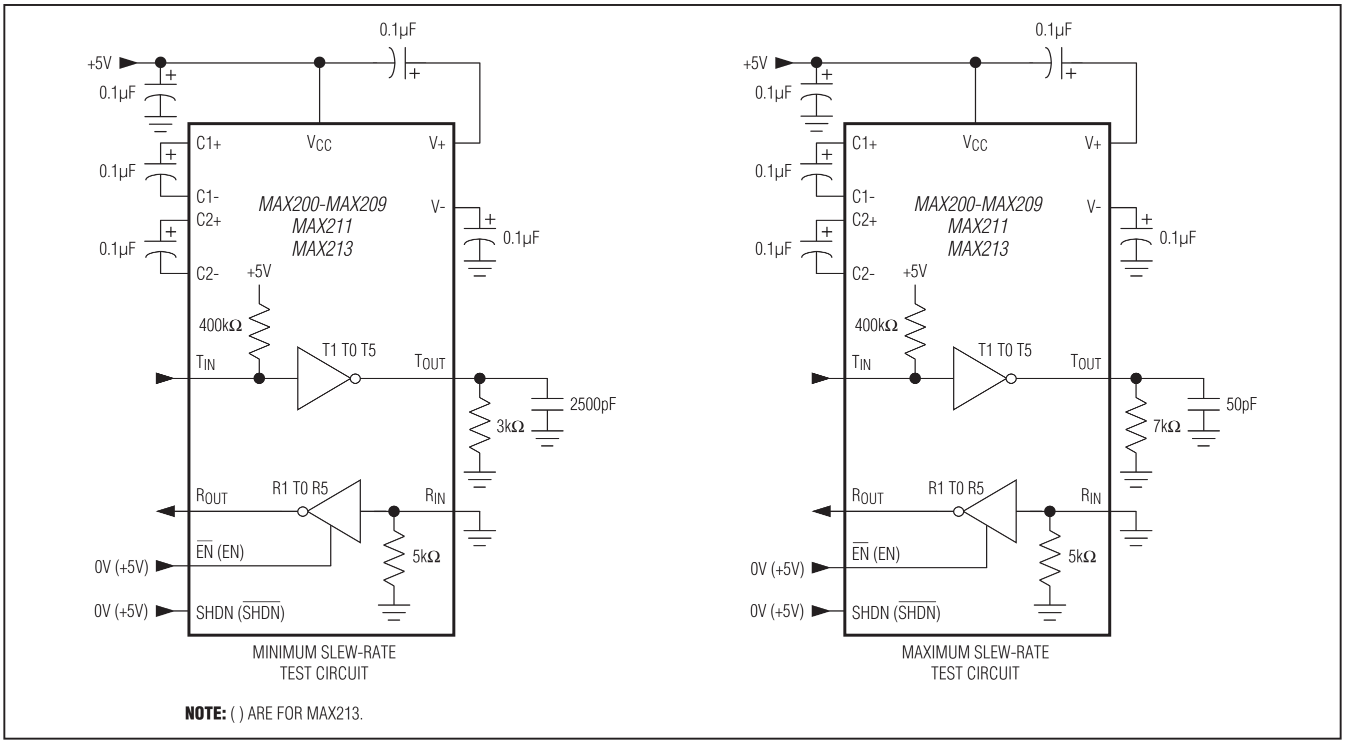



Figure 3. Transition Slew-Rate Test Circuit

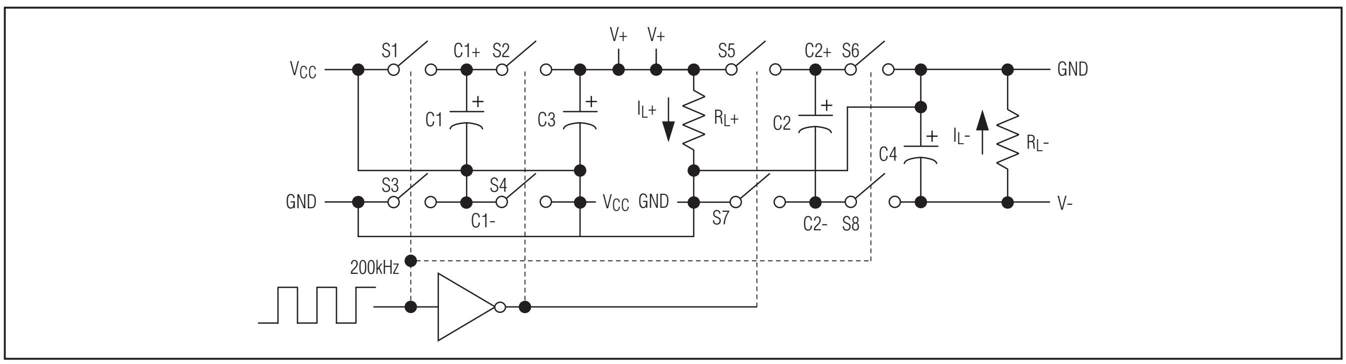



Figure 4. Dual Charge-Pump Diagram

### RS-232 Receivers

The receivers convert RS-232 signals to CMOS logic output levels. Receiver outputs are inverting, maintaining compatibility with driver outputs. The guaranteed receiver input thresholds of +0.8V and +2.4V are significantly tighter than the ±3.0V threshold required by the EIA/TIA-232E specification. This allows receiver inputs to respond to TTL/CMOS logic levels and improves noise margin for RS-232 levels.

The MAX200–MAX209/MAX211/MAX213 guaranteed +0.8V threshold (+0.6V in shutdown for the MAX213) ensures that receivers shorted to ground have a logic 1 output. Also, the 5kΩ input resistance to ground ensures that a receiver with its input left open also has a logic 1 output.

Receiver inputs have approximately +0.5V hysteresis. This provides clean output transitions, even with slow rise and fall time input signals with moderate amounts of noise and ringing. In shutdown, the MAX213 receivers R4 and R5 have no hysteresis.

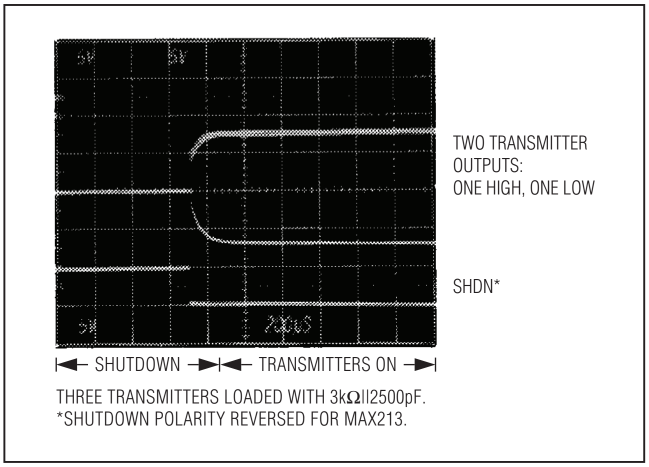



*Figure 5. Transmitter Outputs When Exiting Shutdown*

### *Shutdown and Enable Control*

In shutdown mode, the MAX200/MAX205/MAX206/MAX211/MAX213 charge pumps are turned off, V+ is pulled down to $V_{CC}$, V- is pulled to ground, and the transmitter outputs are disabled. This reduces supply current typically to 1μA (15μA for the MAX213). The time required to exit shutdown is 1ms, as shown in Figure 5.

All receivers except R4 and R5 on the MAX213 are put into a high-impedance state in shutdown mode. The MAX213's R4 and R5 receivers still function in shutdown mode. These two receivers are useful for monitoring external activity while maintaining minimal power consumption.

The enable control is used to put the receiver outputs into a high-impedance state, so that the receivers can be connected directly to a three-state bus. It has no effect on the RS-232 drivers or on the charge pumps.

### *MAX213 Receiver Operation in Shutdown*

During normal operation, the MAX213's receiver propagation delay is typically 1μs. When entering shutdown with receivers active, R4 and R5 are not valid until 80μs after $\overline{SHDN}$ is driven low. In shutdown mode, propagation delays increase to 4μs for a high-to-low or a low-to-high transition.

When exiting shutdown, all receiver outputs are invalid until the charge pumps reach nominal values (< 2ms when using 0.1μF capacitors).

## Table 1a. MAX200 Control Pin Configurations

| SHDN | OPERATION STATUS | TRANSMITTERS T1–T5 |
|---|---|---|
| 0 | Normal Operation | All Active |
| 1 | Shutdown | All High-Z |

## Table 1b. MAX205/MAX206/MAX211 Control Pin Configurations

| SHDN | $\overline{EN}$ | OPERATION STATUS | TRANSMITTERS T1–T5 | RECEIVERS R1–R5 |
|---|---|---|---|---|
| 0 | 0 | Normal Operation | All Active | All Active |
| 0 | 1 | Normal Operation | All Active | All High-Z |
| 1 | 0 | Shutdown | All High-Z | All High-Z |

## Table 1c. MAX213 Control Pin Configurations

| $\overline{SHDN}$ | EN | OPERATION STATUS | TRANSMITTERS T1–T4 | RECEIVERS | |
|---|---|---|---|---|---|
| | | | | R1, R2, R3 | R4, R5 |
| 0 | 0 | Shutdown | All High-Z | High-Z | High-Z |
| 0 | 1 | Shutdown | All High-Z | High-Z | Active* |
| 1 | 0 | Normal Operation | All Active | High-Z | High-Z |
| 1 | 1 | Normal Operation | All Active | Active | Active |

**Active = active with reduced performance.*

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

## Applications Information

### Capacitor Selection

The type of capacitor used is not critical for proper operation. Ceramic capacitors are suggested. To ensure proper RS-232 signal levels over temperature when using 0.1µF capacitors, make sure the capacitance value does not degrade excessively as the temperature varies. If in doubt, use capacitors with a larger nominal value. Also observe the capacitors' ESR value over temperature, since it influences the amount of ripple on V+ and V-. To reduce the output impedance at V+ and V-, use larger capacitors (up to 10µF). If polarized capacitors are used, obey the polarities shown in Figure 1 and the pin configurations.

### Driving Multiple Receivers

Each transmitter is designed to drive a single receiver. Transmitters can be paralleled to drive multiple receivers.

### Driver Outputs When Exiting Shutdown

Figure 5 shows two driver outputs exiting shutdown. As they become active, the two driver outputs go to opposite RS-232 levels (one driver input is high, the other is low). Each driver is loaded with 3kΩ in parallel with 2500pF. The driver outputs display no ringing or undesirable transients as they come out of shutdown.

### Power-Supply Decoupling

In applications that are sensitive to power-supply noise, decouple $V_{CC}$ to ground with a capacitor of the same value as the charge-pump capacitors.

### V+ and V- as Power Supplies

A small amount of power can be drawn from V+ and V-, although this reduces noise margins.

### Power Supplies for MAX201/MAX209

If at power-up the V+ supply rises after the $V_{CC}$ supply, place a diode (e.g., 1N914) in series with the V+ supply.

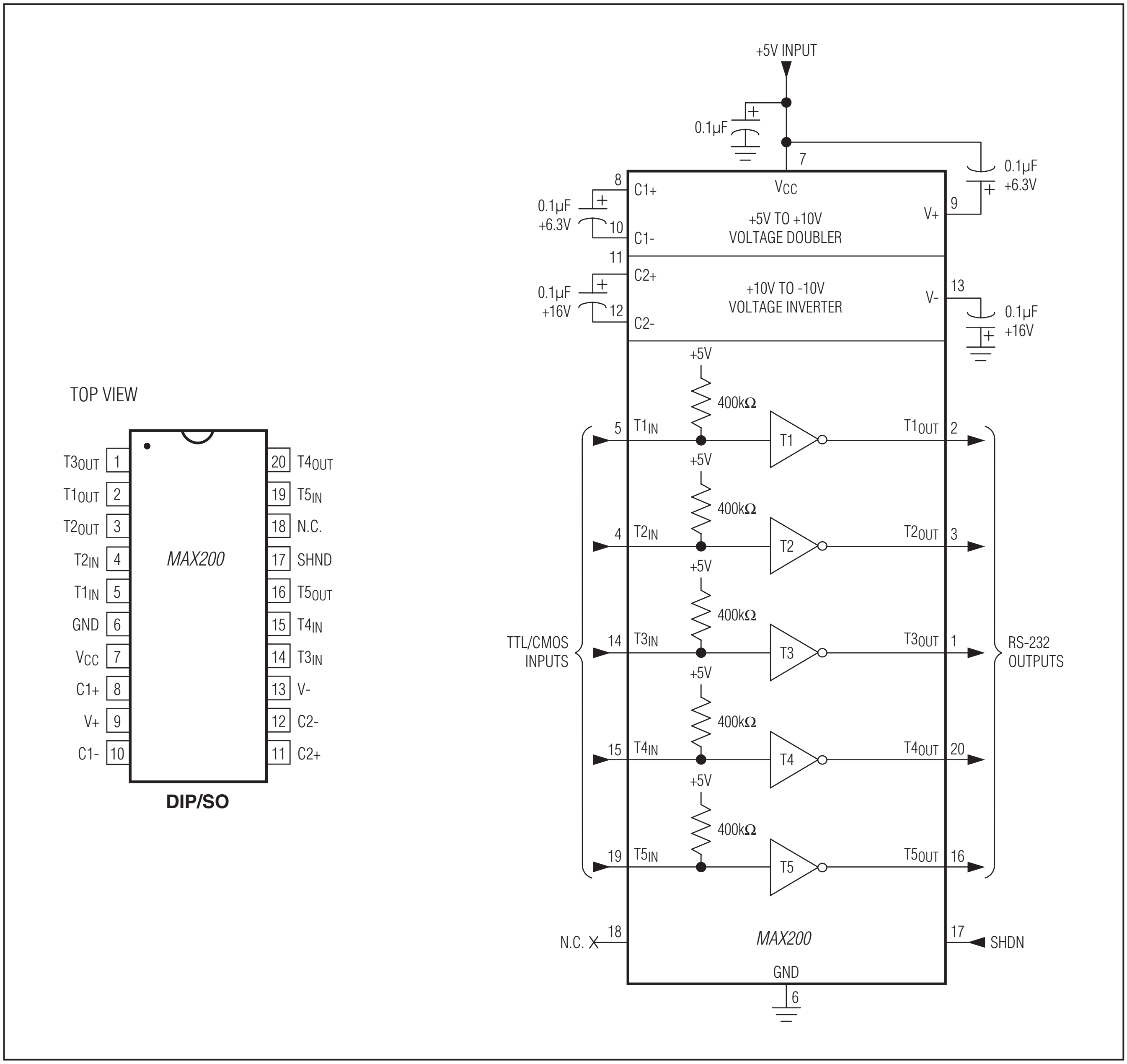
**Table 2. Summary of EIA/TIA-232E, V.28 Specifications**

| PARAMETER | CONDITION | EIA/TIA-232E, V.28 SPECIFICATION |
|---|---|---|
| Driver Output Voltage: 0 Level | 3kΩ to 7kΩ load | +5.0V to +15V |
| Driver Output Voltage: 1 Level | 3kΩ to 7kΩ load | -5.0V to -15V |
| Output Level, Maximum | No load | ±25V |
| Data Rate | $3k\Omega \le R_L \le 7k\Omega$, $C_L \le 2500pF$ | Up to 20kbps |
| Receiver Input Voltage: 0 Level | — | +3.0V to +15V |
| Receiver Input Voltage: 1 Level | — | -3.0V to -15V |
| Input Level, Maximum | — | ±25V |
| Instantaneous Slew Rate, Maximum | $3k\Omega \le R_L \le 7k\Omega$, $C_L \le 2500pF$ | 30V/µs |
| Driver Output Short-Circuit Current, Maximum | — | 100mA |
| Transition Rate on Driver Output | V.28 | 1ms or 3% of the period |
| | EIA/TIA-232E | 4% of the period |
| Driver Output Resistance | $-2V < V_{OUT} < +2V$ | 300Ω |

**Table 3. DB9 Cable Connections Commonly Used for EIA/TIA-232E and V.24 Asynchronous Interfaces**

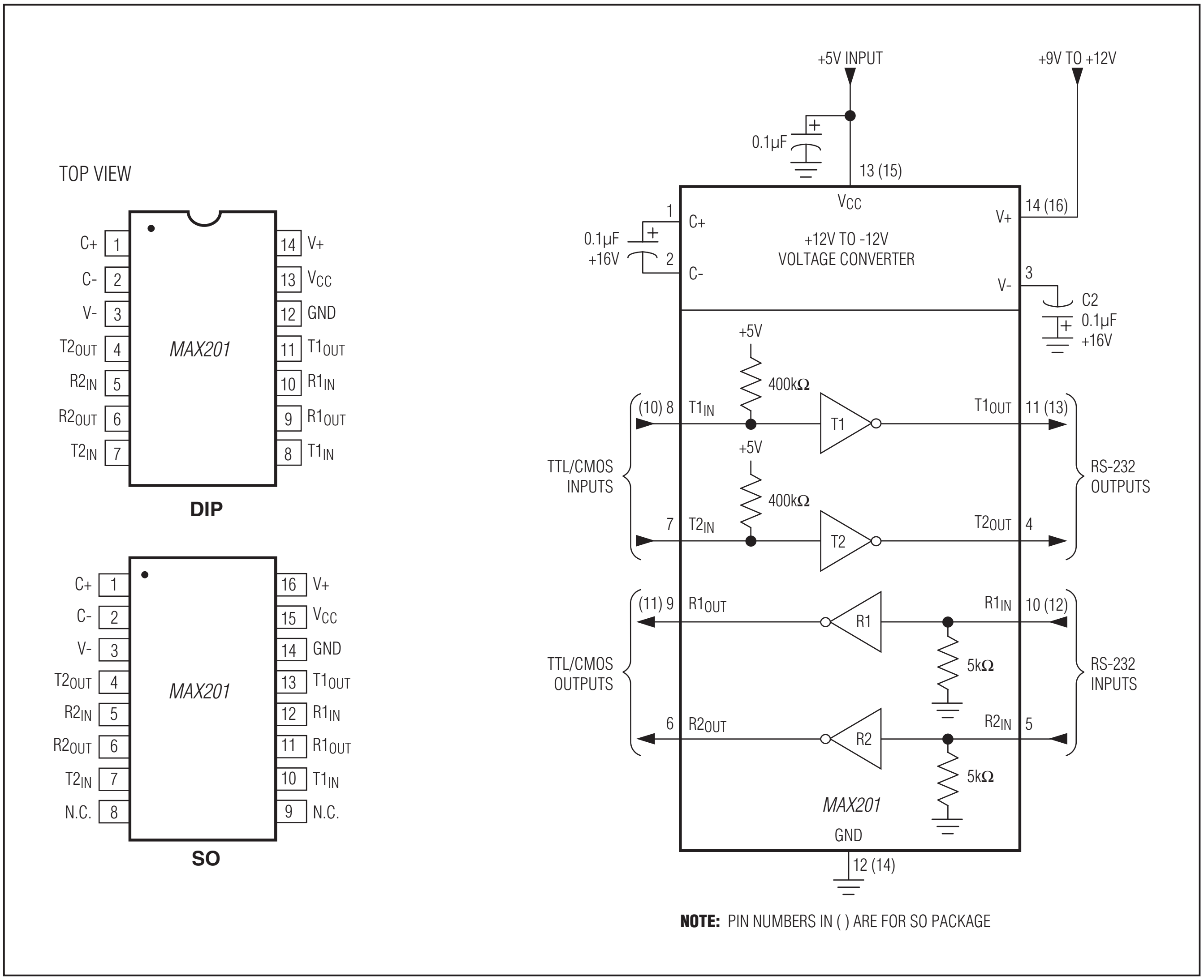
| PIN | NAME | CONNECTION |
|---|---|---|
| 1 | Received Line Signal Detector, sometimes called Carrier Detect (DCD) | Handshake from DCE |
| 2 | Receive Data (RD) | Data from DCE |
| 3 | Transmit Data (TD) | Data from DTE |
| 4 | Data Terminal Ready | Handshake from DTE |
| 5 | Signal Ground | Reference point for signals |
| 6 | Data Set Ready (DSR) | Handshake from DCE |
| 7 | Request to Send (RTS) | Handshake from DTE |
| 8 | Clear to Send (CTS) | Handshake from DCE |
| 9 | Ring Indicator | Handshake from DCE |

## MAX200 Pin Configuration/Typical Operating Circuit



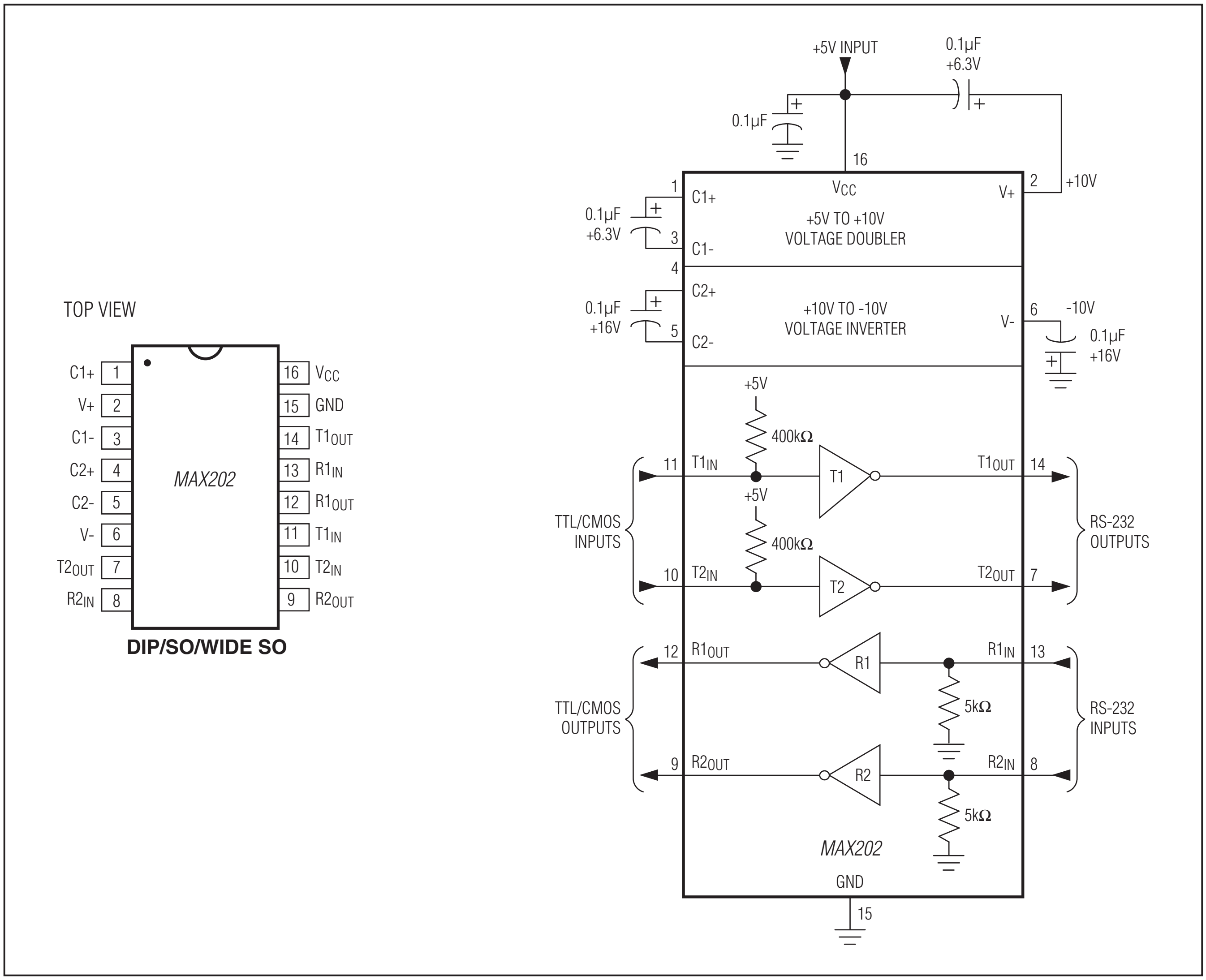
# +5V, RS-232 Transceivers with 0.1μF External Capacitors

## MAX201 Pin Configurations/Typical Operating Circuit



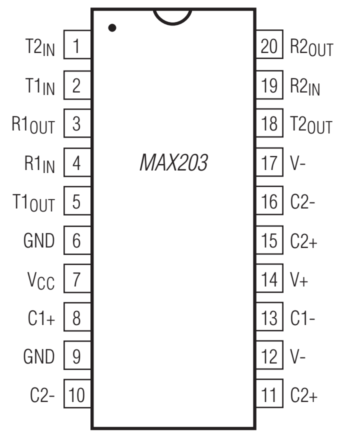
# +5V, RS-232 Transceivers with 0.1μF External Capacitors

## MAX202 Pin Configuration/Typical Operating Circuit

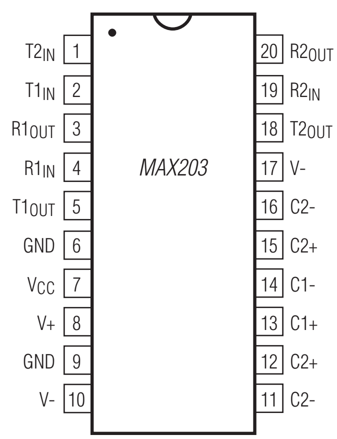


### MAX203 Pin Configurations/Typical Operating Circuit

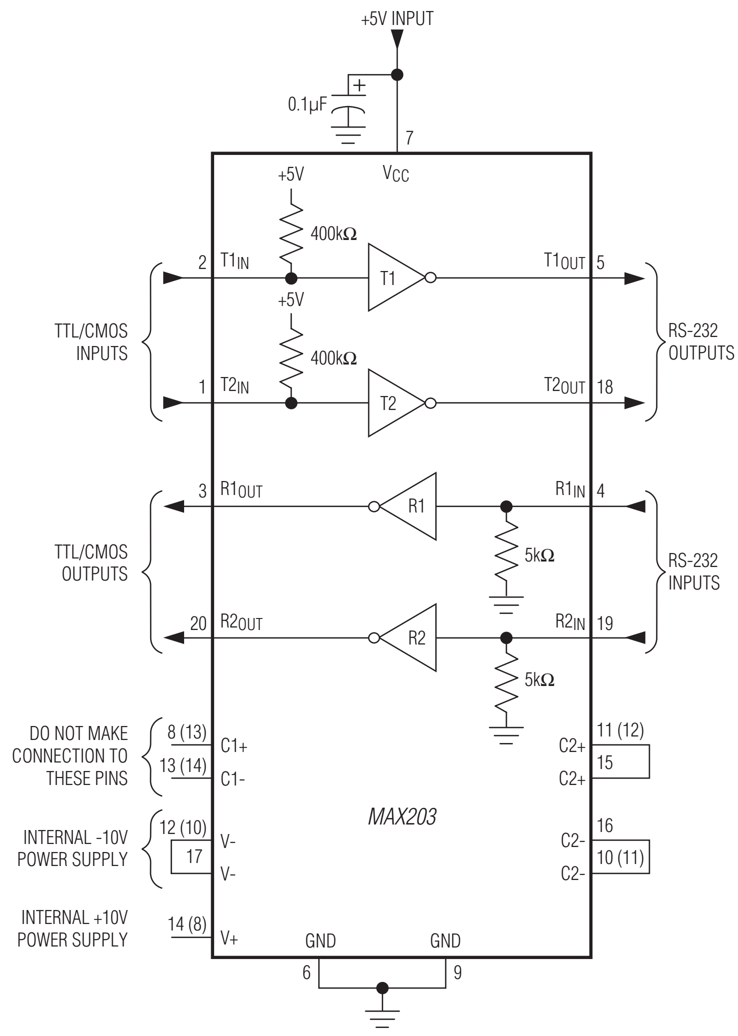
TOP VIEW




**DIP**

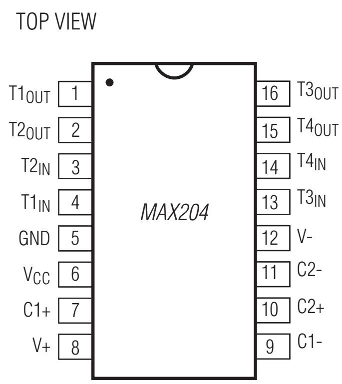



**SO**

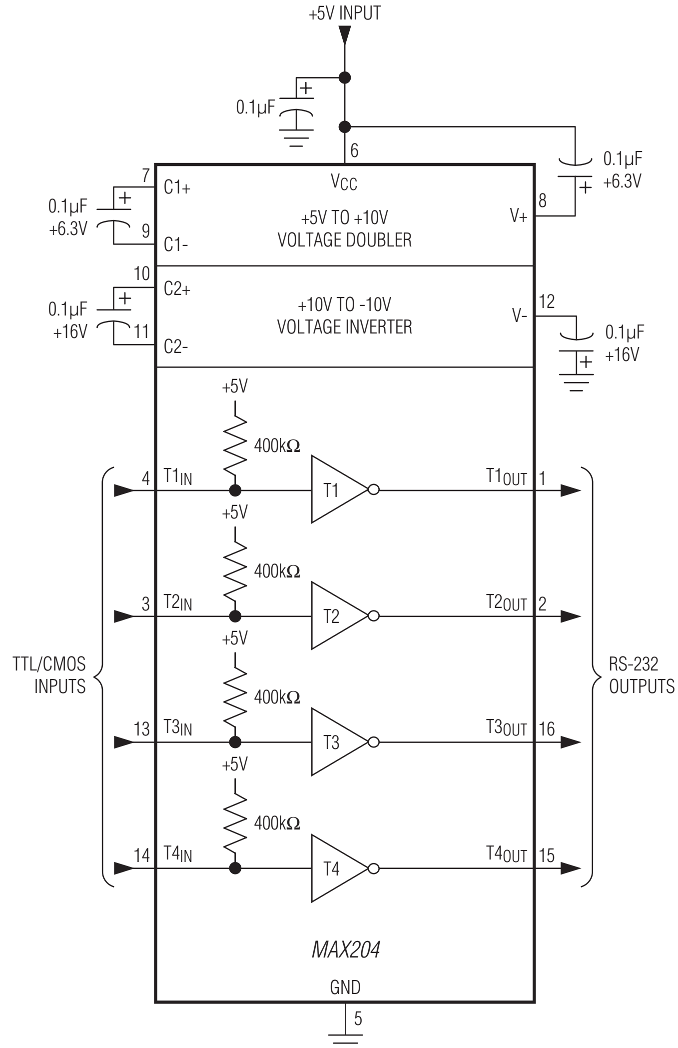



**NOTE:** PIN NUMBERS IN ( ) ARE FOR SO PACKAGE.

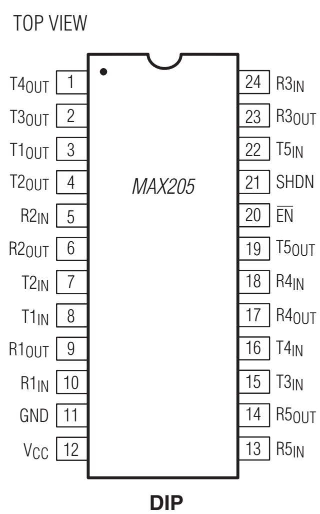
## MAX204 Pin Configuration/Typical Operating Circuit

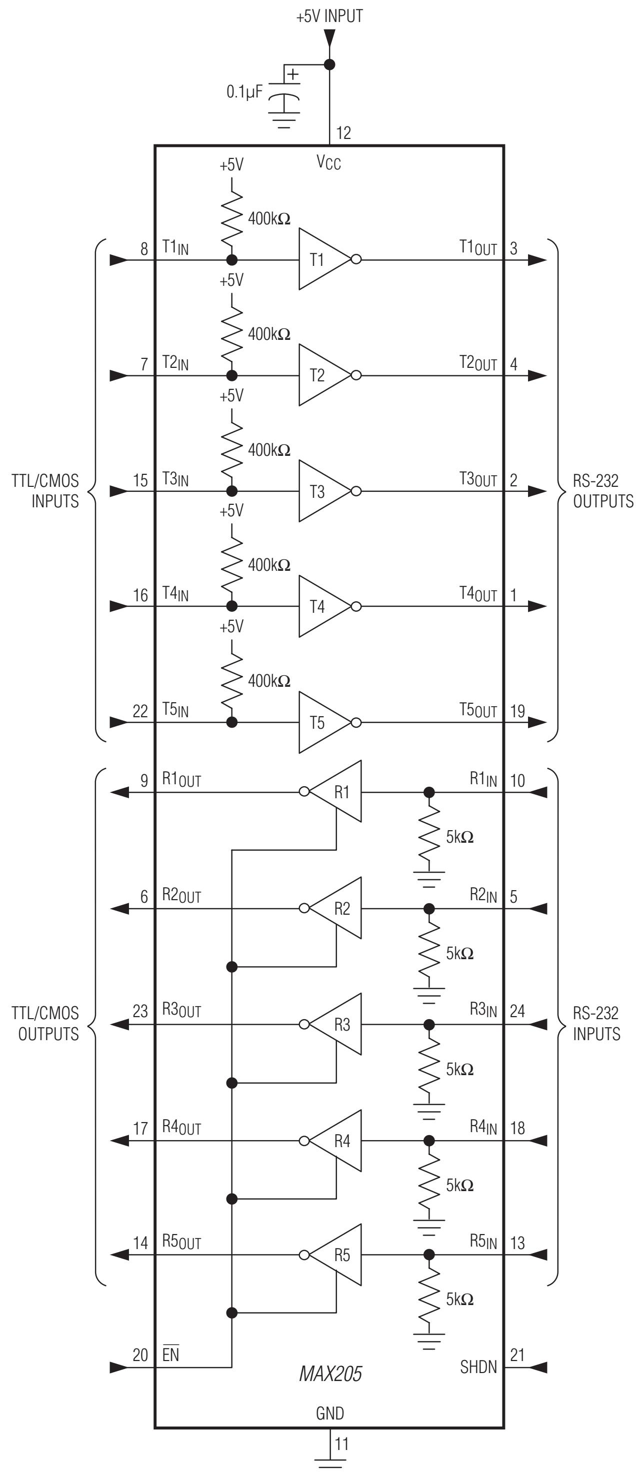



DIP/SO

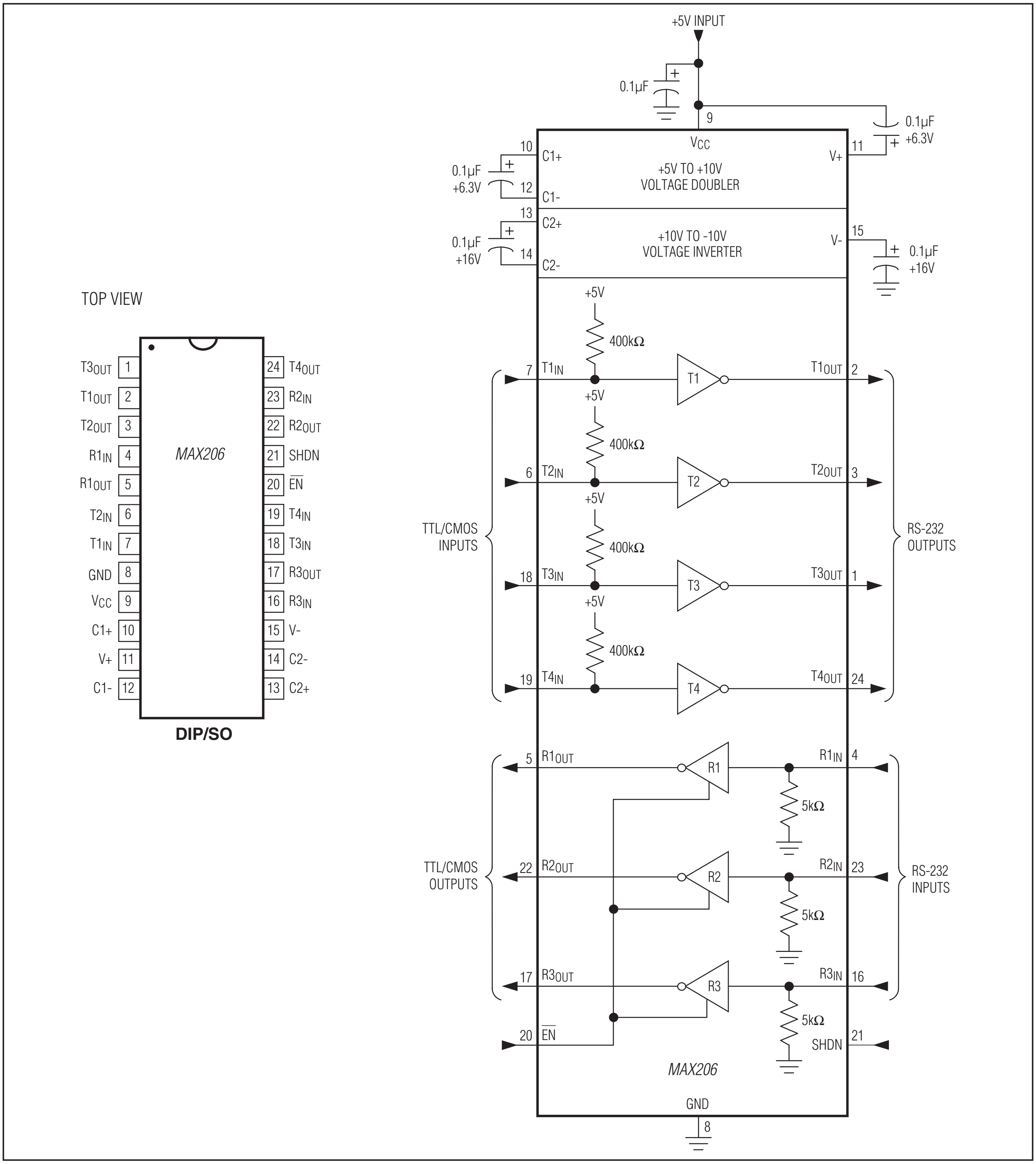


### MAX205 Pin Configuration/Typical Operating Circuit

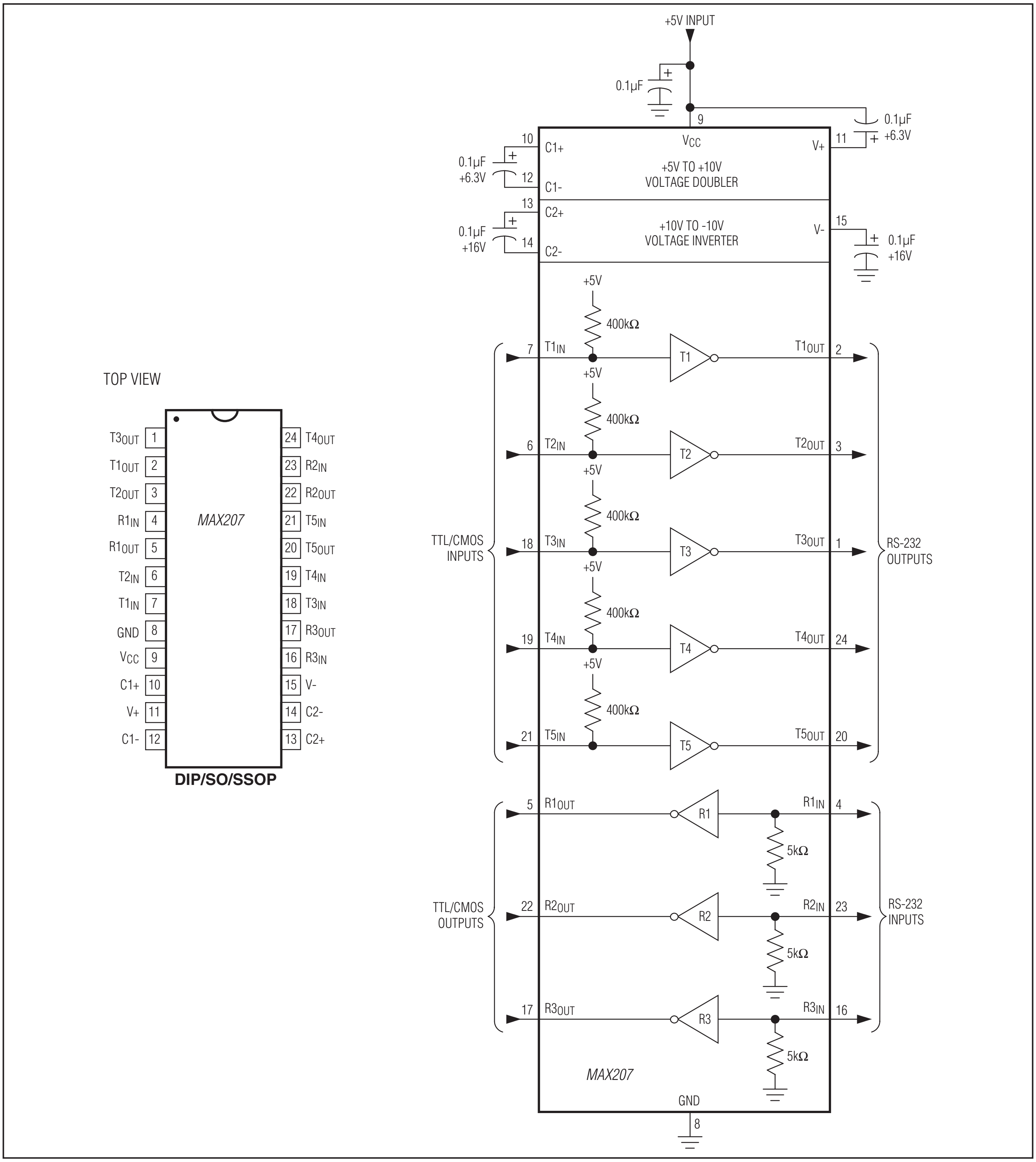


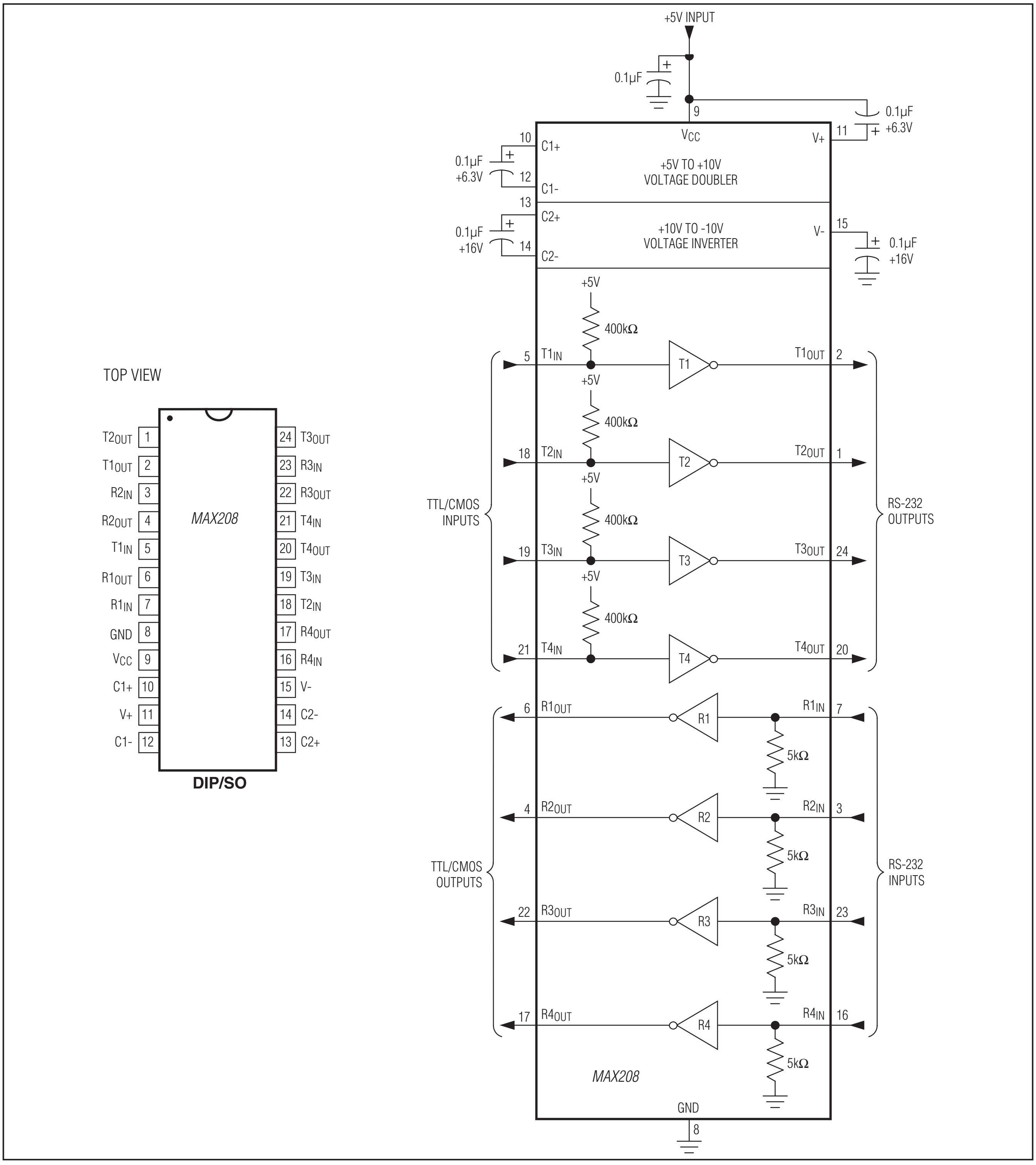
### MAX206 Pin Configuration/Typical Operating Circuit



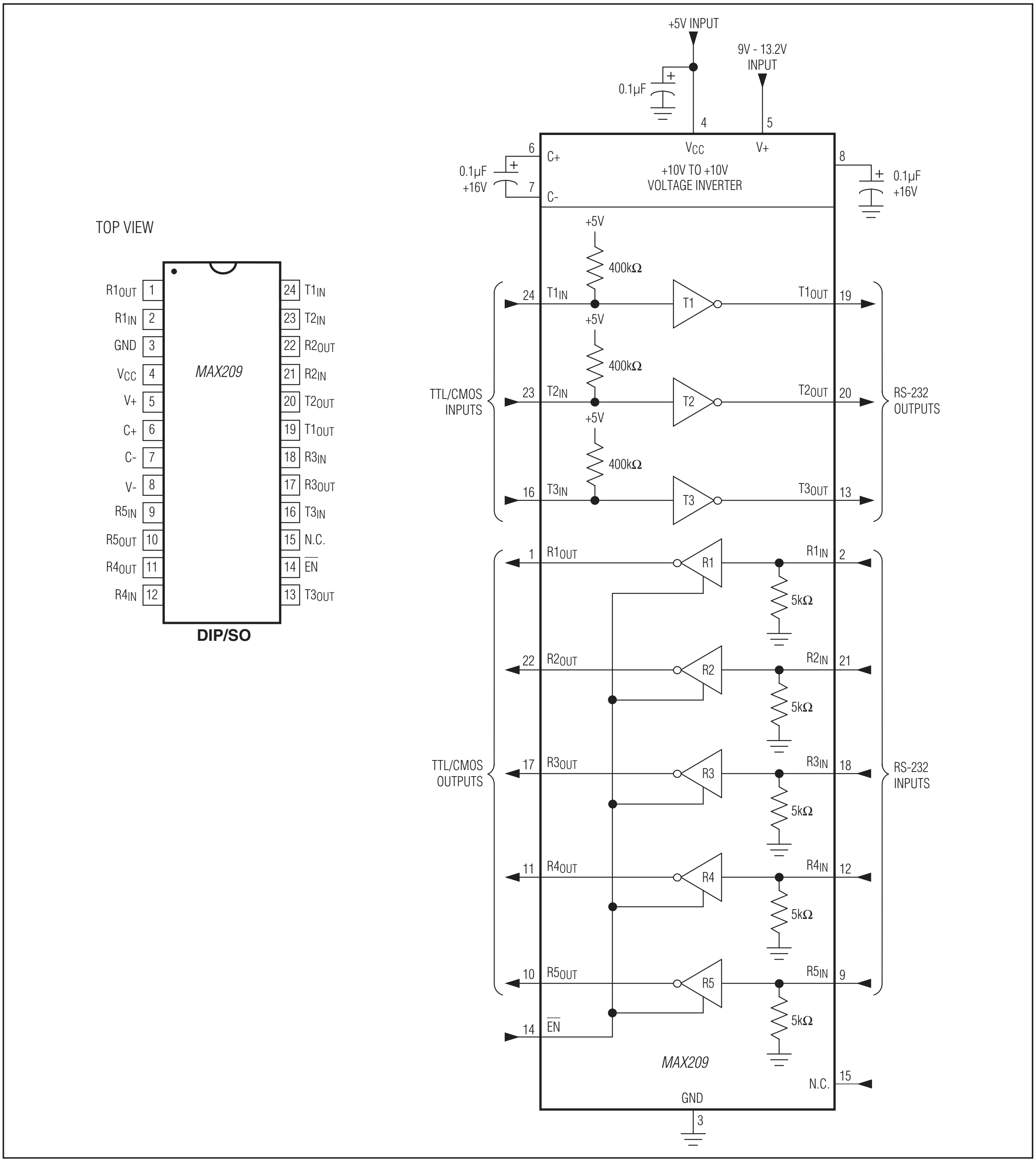
### MAX207 Pin Configuration/Typical Operating Circuit



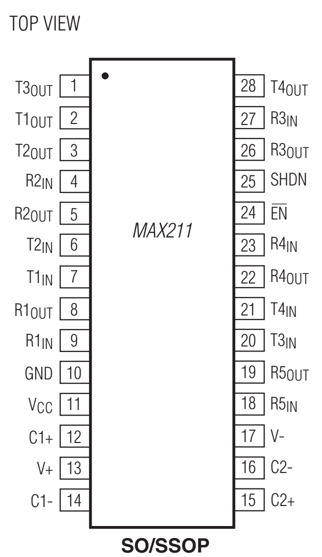
## MAX208 Pin Configuration/Typical Operating Circuit

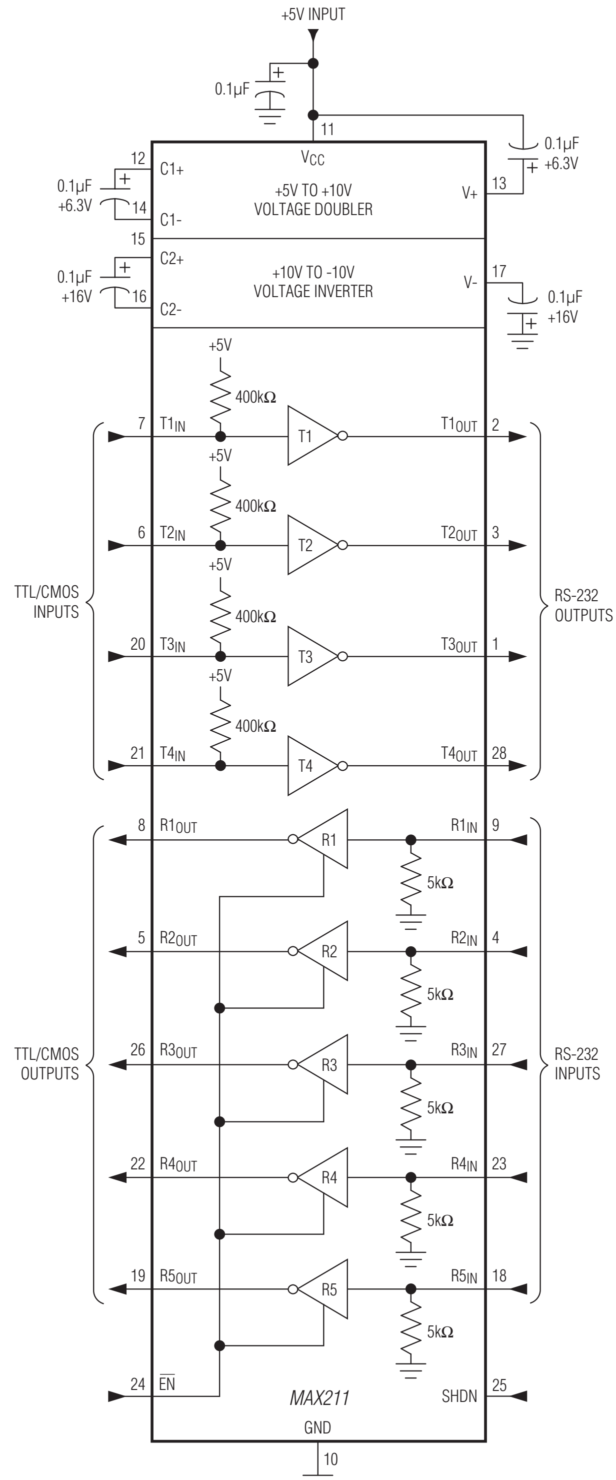


### MAX209 Pin Configuration/Typical Operating Circuit

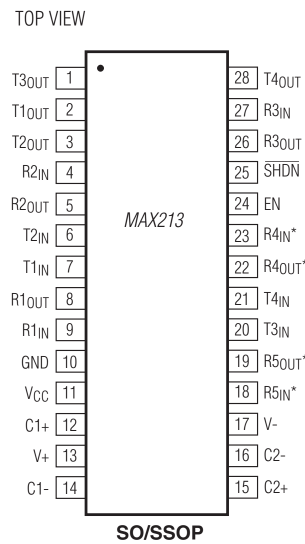


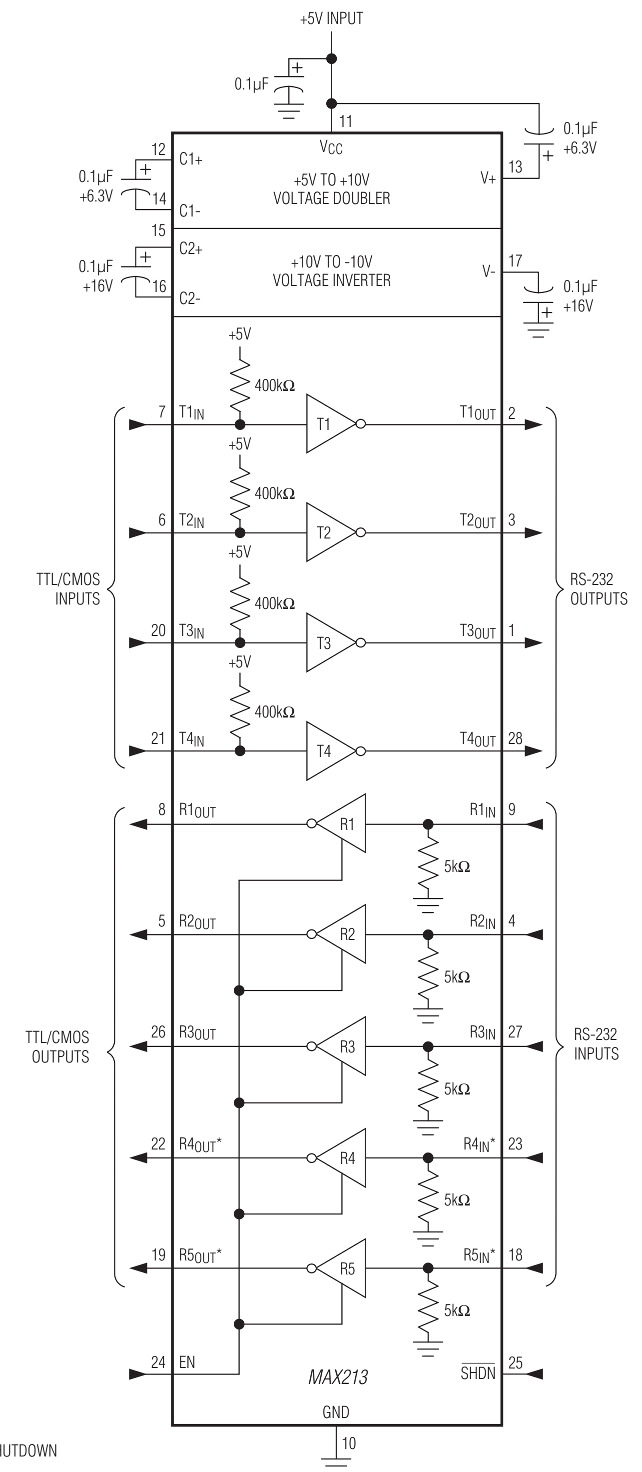
## MAX211 Pin Configuration/Typical Operating Circuit



### MAX213 Pin Configuration/Typical Operating Circuit




*ACTIVE IN SHUTDOWN

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

## Ordering Information

| PART | TEMP RANGE | PIN-PACKAGE |
|---|---|---|
| **MAX200**CPP | 0°C to +70°C | 20 Plastic DIP |
| MAX200CWP | 0°C to +70°C | 20 Wide SO |
| MAX200EPP | -40°C to +85°C | 20 Plastic DIP |
| MAX200EWP | -40°C to +85°C | 20 Wide SO |
| **MAX201**CPD | 0°C to +70°C | 14 Plastic DIP |
| MAX201CWE | 0°C to +70°C | 16 Wide SO |
| MAX201C/D | 0°C to +70°C | Dice* |
| MAX201EPD | -40°C to +85°C | 14 Plastic DIP |
| MAX201EWE | -40°C to +85°C | 16 Wide SO |
| **MAX202**CPE | 0°C to +70°C | 16 Plastic DIP |
| MAX202CSE | 0°C to +70°C | 16 Narrow SO |
| MAX202CWE | 0°C to +70°C | 16 Wide SO |
| MAX202C/D | 0°C to +70°C | Dice* |
| MAX202EPE | -40°C to +85°C | 16 Plastic DIP |
| MAX202ESE | -40°C to +85°C | 16 Narrow SO |
| MAX202EWE | -40°C to +85°C | 16 Wide SO |
| **MAX203**CPP | 0°C to +70°C | 20 Plastic DIP |
| MAX203CWP | 0°C to +70°C | 20 Wide SO |
| MAX203EPP | -40°C to +85°C | 20 Plastic DIP |
| MAX203EWP | -40°C to +85°C | 20 Wide SO |
| **MAX204**CPE | 0°C to +70°C | 16 Plastic DIP |
| MAX204CWE | 0°C to +70°C | 16 Wide SO |
| MAX204C/D | 0°C to +70°C | Dice* |
| MAX204EPE | -40°C to +85°C | 16 Plastic DIP |
| MAX204EWE | -40°C to +85°C | 16 Wide SO |
| **MAX205**CPG | 0°C to +70°C | 24 Wide Plastic DIP |
| MAX205EPG | -40°C to +85°C | 24 Wide Plastic DIP |
| **MAX206**CNG | 0°C to +70°C | 24 Narrow Plastic DIP |
| MAX206CWG | 0°C to +70°C | 24 Wide SO |
| MAX206CAG | 0°C to +70°C | 24 SSOP |
| MAX206ENG | -40°C to +85°C | 24 Narrow Plastic DIP |

| PART | TEMP RANGE | PIN-PACKAGE |
|---|---|---|
| MAX206EWG | -40°C to +85°C | 24 Wide SO |
| MAX206EAG | -40°C to +85°C | 24 SSOP |
| **MAX207**CNG | 0°C to +70°C | 24 Narrow Plastic DIP |
| MAX207CWG | 0°C to +70°C | 24 Wide SO |
| MAX207CAG | 0°C to +70°C | 24 SSOP |
| MAX207ENG | -40°C to +85°C | 24 Narrow Plastic DIP |
| MAX207EWG | -40°C to +85°C | 24 Wide SO |
| MAX207EAG | -40°C to +85°C | 24 SSOP |
| **MAX208**CNG | 0°C to +70°C | 24 Narrow Plastic DIP |
| MAX208CWG | 0°C to +70°C | 24 Wide SO |
| MAX208CAG | 0°C to +70°C | 24 SSOP |
| MAX208C/D | 0°C to +70°C | Dice* |
| MAX208ENG | -40°C to +85°C | 24 Narrow Plastic DIP |
| MAX208EWG | -40°C to +85°C | 24 Wide SO |
| MAX208EAG | -40°C to +85°C | 24 SSOP |
| **MAX209**CNG | 0°C to +70°C | 24 Narrow Plastic DIP |
| MAX209CWG | 0°C to +70°C | 24 Wide SO |
| MAX209C/D | 0°C to +70°C | Dice* |
| MAX209ENG | -40°C to +85°C | 24 Narrow Plastic DIP |
| MAX209EWG | -40°C to +85°C | 24 Wide SO |
| **MAX211**CWI | 0°C to +70°C | 28 Wide SO |
| MAX211CAI | 0°C to +70°C | 28 SSOP |
| MAX211C/D | 0°C to +70°C | Dice* |
| MAX211EWI | -40°C to +85°C | 28 Wide SO |
| MAX211EAI | -40°C to +85°C | 28 SSOP |
| **MAX213**CWI | 0°C to +70°C | 28 Wide SO |
| MAX213CAI | 0°C to +70°C | 28 SSOP |
| MAX213C/D | 0°C to +70°C | Dice* |
| MAX213EWI | -40°C to +85°C | 28 Wide SO |
| MAX213EAI | -40°C to +85°C | 28 SSOP |

**Contact factory for dice specifications.*

# +5V, RS-232 Transceivers with 0.1μF External Capacitors

## Package Information

For the latest package outline information and land patterns, go to **www.maxim-ic.com/packages**. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

| PACKAGE TYPE | PACKAGE CODE | DOCUMENT NO. |
|---|---|---|
| 14 CDIP | J14-3 | 21-0045 |
| 16 CDIP | J16-3 | 21-0045 |
| 20 CDIP | J20-2 | 21-0045 |
| 24 CDIP | R24-4 | 21-0045 |
| 14 PDIP | P14-3 | 21-0043 |
| 16 PDIP | P16-1 | 21-0043 |
| 20 PDIP | P20-3 | 21-0043 |
| 24 PDIP | N24-2 | 21-0043 |
| 24 PDIP | N24-3 | 21-0043 |
| 24 PDIP | P24-1 | 21-0044 |
| 24 PDIP | P24M-1 | 21-0044 |
| 16 SO | S16-3 | 21-0041 |
| 16 SO | W16-3 | 21-0042 |
| 16 SO | W16-1 | 21-0042 |
| 20 SO | W20M-1 | 21-0042 |
| 20 SO | W20-3 | 21-0042 |
| 24 SO | W24-2 | 21-0042 |
| 28 SO | W28-1 | 21-0042 |
| 28 SO | W28-2 | 21-0042 |
| 24 SSOP | A24-3 | 21-0056 |
| 24 SSOP | A24-2 | 21-0056 |
| 28 SSOP | A28-1 | 21-0056 |
| 16 TSSOP | U16-1 | 21-0066 |

# +5V, RS-232 Transceivers with 0.1µF External Capacitors

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 6 | 10/03 | Changed the *Features* section and section information to the *Next-Generation Device Features* section. | 1 |
| 7 | 12/05 | Added Note 1 to the *Absolute Maximum Ratings* section. | 2 |