

General Description

The MAX232 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 1.0 μ F 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.



Features

- Output voltage levels are compatible with input levels of CMOS and TTL integrated circuits
- Meets All EIA/TIA-232E and V.28/V.24 Specifications
- Supply voltage range from 5.5V
- Low input current: 1.0 μ A at 25 $^{\circ}$ C
- Output current 30mA
- Available in SOP- 16 Package

Applications

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

Order Information

Product Model	Package Type	Marking	Packing	Packing Qty	Additional Remarks
MAX202EN	DIP- 16	MAX202EN	Tape	1000/Box	
MAX202EDTR	SOP- 16	MAX202E	Tube	2500/Reel	
MAX202EDTR	SOP- 16	MAX202EE	Tube	2500/Reel	ESD

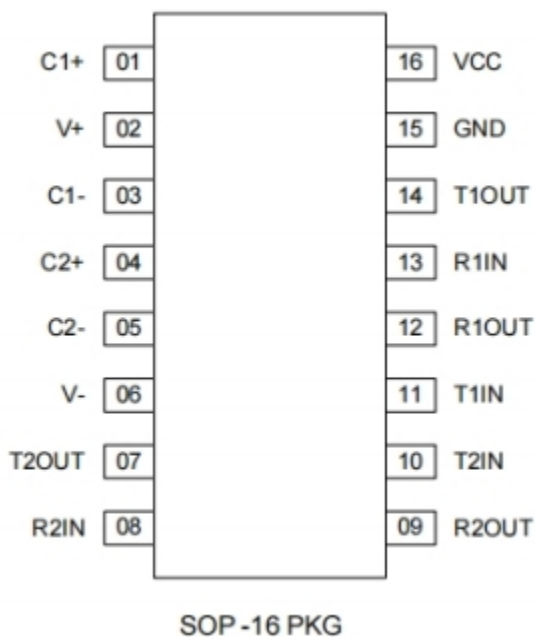
ABSOLUTE MAXIMUM RATINGS

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	T_{STG}	-65	150	°C

RECOMMENDED OPERATING CONDITIONS

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}	-	±60	mA
Ambient Temperature Range	T_A	-40	+85	°C

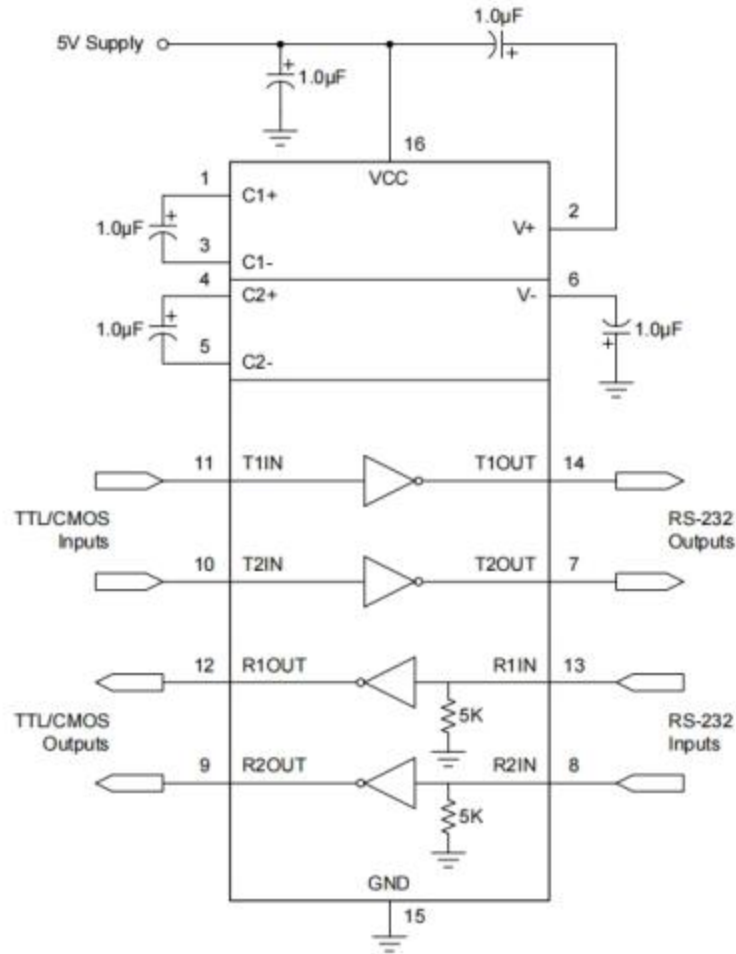
PIN CONFIGURATION



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	T2 OUT	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

TYPICAL APPLICATION CIRCUIT



FUNCTION TABLE

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

ELECTRICAL CHARACTERISTICS

(Limits in standard typeface are for $T_A = 25^\circ\text{C}$, and the limits in boldface type apply over full operating temperature range.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Supply Current	I_{CC}	$V_{CC} = 5.5V$ $V_{IL} = 0V$	-	-	10.0 14.0	mA	
Receiver Parameters							
Hysteresis Voltage	V_h	$V_{CC} = 5.0V$	0.2 0.2	-	0.9 1.0	V	
On (Operation) Voltage	V_{on}	$V_o \leq 0.1V, I_{oL} \leq 20\mu A$	-	-	2.4 2.3	V	
Off (Dropout) Voltage	V_{off}	$V_o \geq V_{CC} - 0.1V$ $I_{oH} \leq -20\mu A$	0.8 0.9	-	-	V	
Output Low Voltage	V_{OL}	$I_L = 3.2mA, V_{CC} = 4.5V,$ $V_{IH} = 2.4V$	-	-	0.3 0.4	V	
Output High Voltage	V_{OH}	$I_{oH} = -1.0mA, V_{CC} = 4.5V,$ $V_{IL} = 0.8V$	3.6 3.5	-	-	V	
Input Resistance	R_i	$V_{CC} = 5.0V$	3.0 3.0	-	7.0 7.0	k Ω	
Transmitter Parameters							
Output Low Voltage	V_{OL}	$V_{CC} = 4.5V, V_{IH} = 2.0V,$ $R_L = 3.0k\Omega$	-	-	-5.2 -5.0	V	
Output High Voltage	V_{OH}	$V_{CC} = 4.5V, V_{IL} = 0.8V,$ $R_L = 3.0k\Omega$	5.2 5.0	-	-	V	
Input Low Current	I_{iL}	$V_{CC} = 5.5V, V_{IL} = 0V$	-	-	-1.0 -10.0	μA	
Input High Current	I_{iH}	$V_{CC} = 5.5V, V_{IH} = V_{CC}$	-	-	1.0 10.0	μA	
Speed Of Output Front Charge	SR	$V_{CC} = 5.0V, C_L = 50 - 1000pF,$ $R_L = 3.0 - 7.0k\Omega$	3.0 2.7	-	30 27	V/ μs	
Output Resistance	R_o	$V_{CC} = V_+ = V_- = 0V$ $V_o = \pm 2V$	350 300	-	-	Ω	
Short Circuit Output Current	I_{sc}	$V_{CC} = 5.5V$ $V_o = 0V$	$V_i = V_{CC}$	-	-	-50 -60	mA
			$V_i = 0$	-	-	50 60	
Speed Of Information Transmission	ST	$V_{CC} = 4.5V, C_L = 1000pF,$ $R_L = 3.0k\Omega, t_w = 7\mu s$ (for extreme, $t_w = 8\mu s$)	140 120	-	-	kbit/s	
Dynamic Parameters							
Signal Propagation Delay Time When Switching On (Off)	t_{PHLR} (t_{PLHR})	$V_{CC} = 4.5V, C_L = 150pF,$ $V_{IL} = 0V, V_{IH} = 3.0V,$ $t_{LH} = t_{HL} \leq 10ns$	-	-	9.7 10.0	μs	
Signal Propagation Delay Time When Switching On (Off)	t_{PHLT} (t_{PLHT})	$V_{CC} = 4.5V, C_L = 2500pF,$ $V_{IL} = 0V, V_{IH} = 3.0V,$ $R_L = 3k\Omega, t_{LH} = t_{HL} \leq 10ns$	-	-	5.0 6.0	μs	

TIMING DIAGRAM

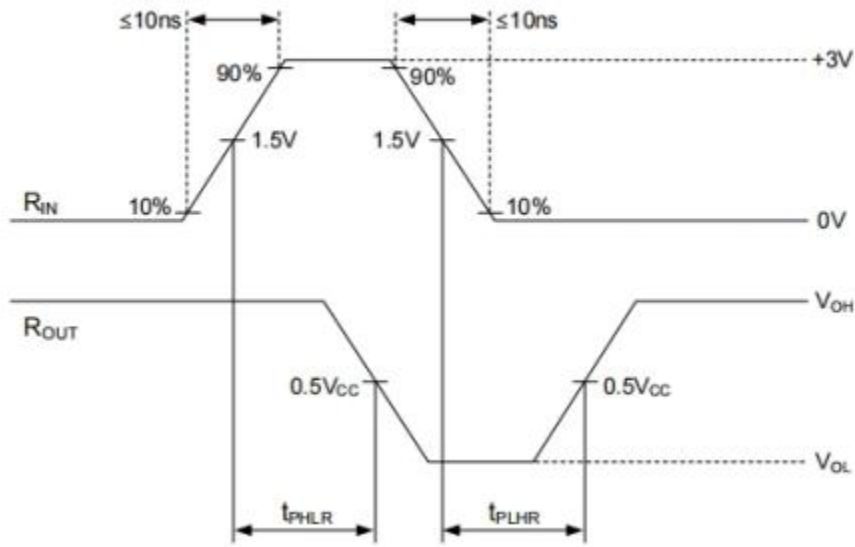


Figure 1 . t_{PHL} and t_{PLH} waveforms of Receiver

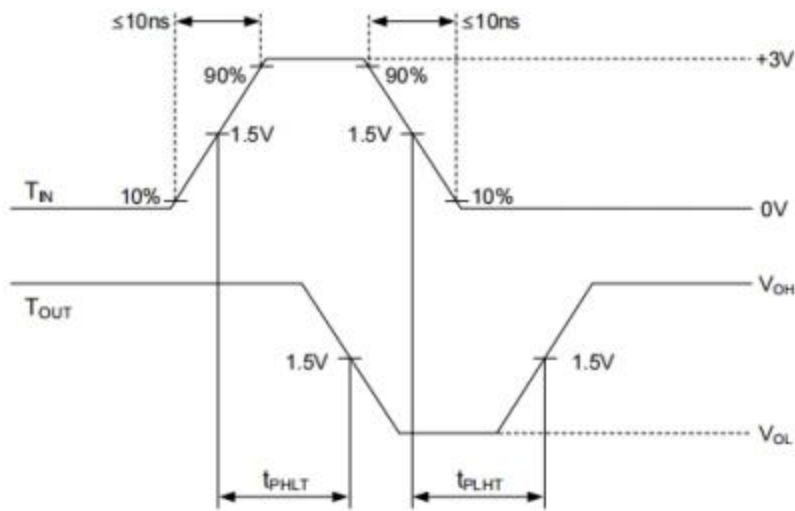


Figure 2 . t_{PHL} and t_{PLH} waveforms of Transmitter

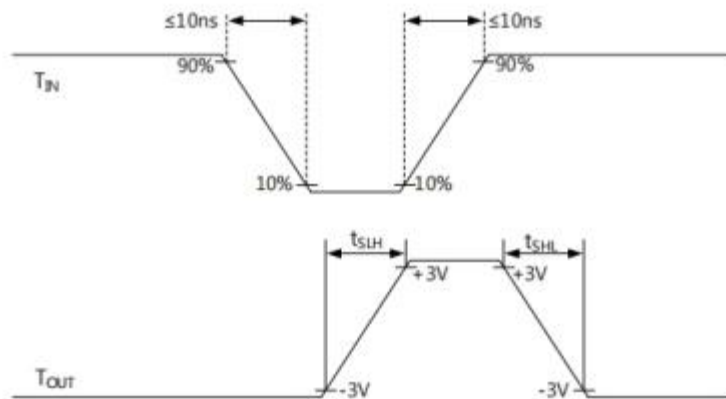
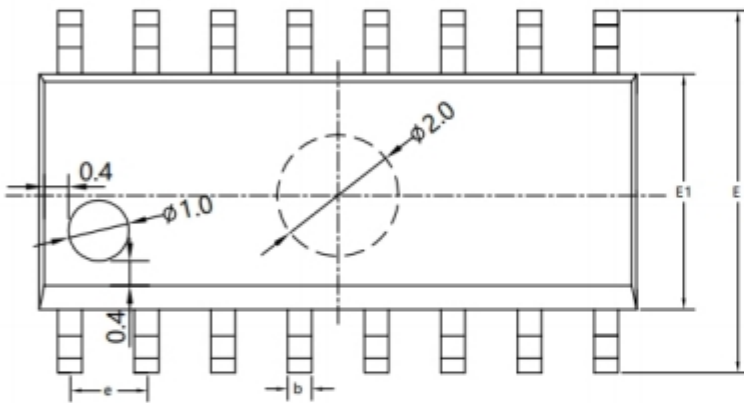
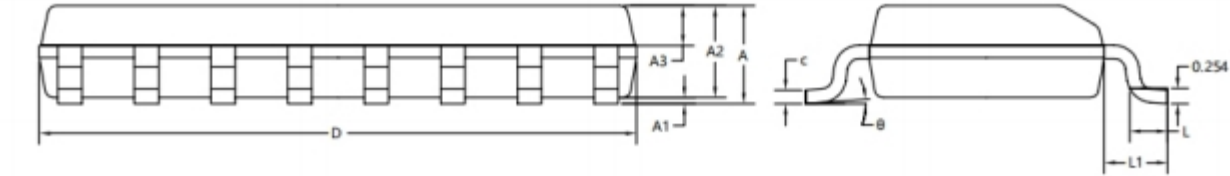


Figure 3 . t_{SLH} and t_{SHL} waveforms of Transmitter

Package Information

SOP16



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.50	1.60	1.70
A1	0.10	0.15	0.25
A2	1.40	1.45	1.50
A3	0.60	0.65	0.70
b	0.30	0.40	0.50
c	0.15	0.20	0.25
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.85	3.90	3.95
e	1.27BSC		
L	0.50	0.60	0.70
L1	1.05BSC		
θ	0°	4°	8°