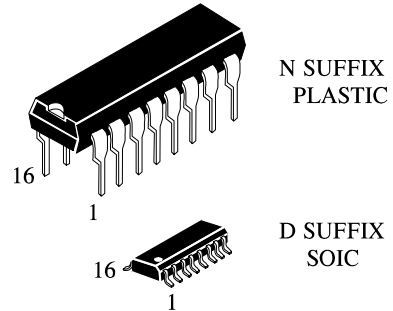


Interface transceiver of RS-232 standard with one supply voltage

IC MAX232 is purposed for application in high-performance information processing systems and control devices of wide application.

Input voltage levels are compatible with standard CMOS levels.

- Output voltage levels are compatible with input levels of C-MOS, N-MOS and TTL integrated circuits.
- Supply voltage range from 2.0 to 6.0 V.
- Low input current: 1.0 mA; 0.1 mA at T = 25 °C.
- Output current 24 mA.
- Latching current not less than 450 mA at T = 25°C
- Tolerable value of static potential not less than 2000V



IC marking in package
 MAX232N Plastic DIP
 MAX232D SOIC
 T_A= from -40 to 85 °C
 For all packages

Truth table

Inputs	Outputs
R _{IN} , T _{IN}	R _{OVT} , T _{OVT}
H	L
L	H

Note -
 H – voltage high level;
 L – low voltage level

Pin symbols in package

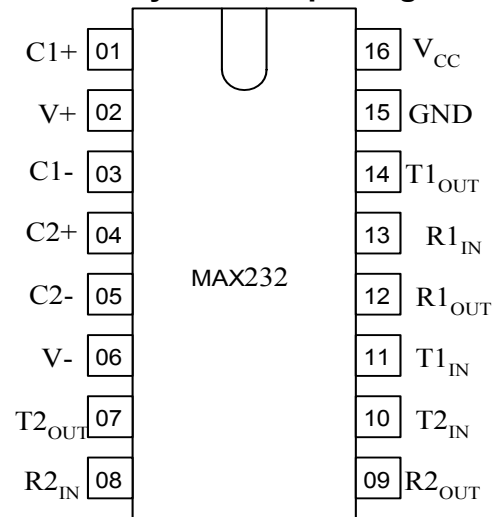


Table of pin description

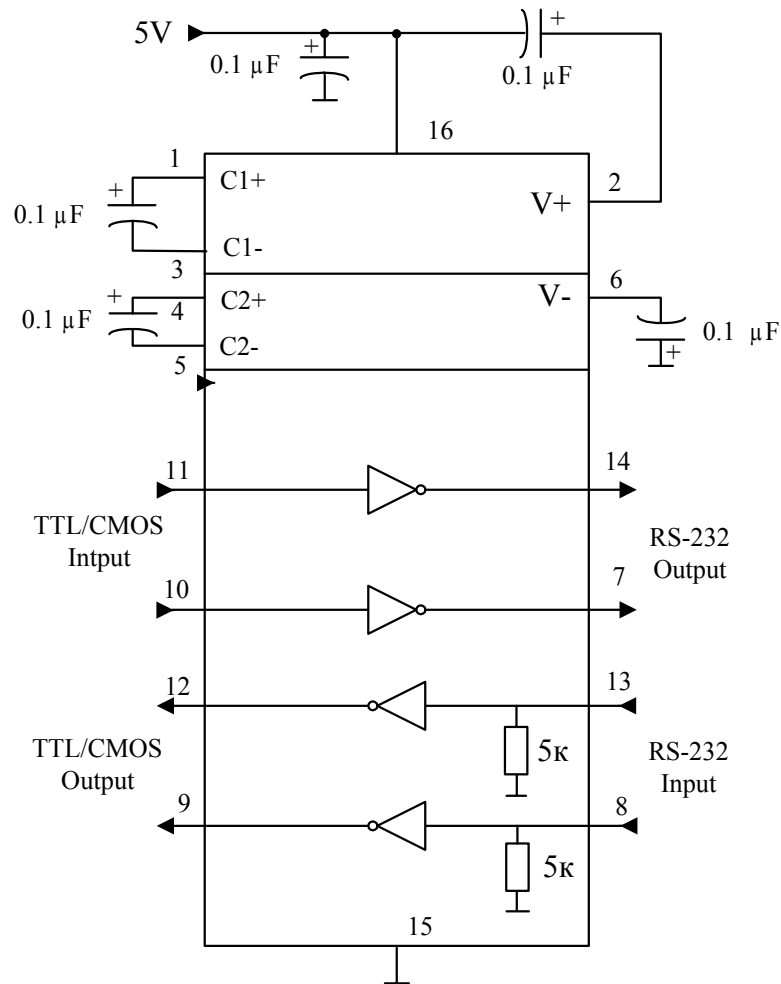
Pin No.	Symbol	Pin name
01	C1+	Output of external capacitance of positive voltage multiplier unit
02	V+	Output of positive voltage of multiplier unit
03	C1-	Output of external capacitance of positive voltage multiplier unit
04	C2+	Output of external capacitance of negative voltage multiplier unit
05	C2-	Output of external capacitance of negative voltage multiplier unit
06	V-	Output of negative voltage of multiplier unit
07	T2 _{OUT}	Output of transmitter data (levels RS – 232)
08	R2 _{IN}	Input of receiver data (levels RS – 232)
09	R2 _{OUT}	Output of receiver data (levels TTL/KMOS)
10	T2 _{IN}	Input of transmitter data (levels TTL/KMOS)
11	T1 _{IN}	Input of transmitter data (levels TTL/KMOS)
12	R1 _{OUT}	Output of receiver data (levels TTL/KMOS)
13	R1 _{IN}	Input of receiver data (levels RS – 232)
14	T1 _{OUT}	Output of transmitter data (levels RS – 232)
15	GND	Common output
16	V _{CC}	Supply output of voltage source

Maximum conditions

Symbol	Parameter	Rate		Unit
		min	max	
V _{CC}	Supply voltage	-0.3	6.0	V
V+	Transmitter high output voltage	V _{CC} - 0.3	14	
V-	Transmitter low output voltage	-0.3	-14	
V _{TIN}	Transmitter input voltage	-0.3	V+ + 0.3	
V _{RIN}	Receiver input voltage	-30	30	
P _D	Dissipated power	-	842 762	mW
	DIP – package SO - package			
I _{SC}	Output current of transmitter short circuit	-	Continuously	mA
T _a	Ambient temperature	-60	150	°C

Absolute maximum conditions

Symbol	Parameter	Rate		Unit
		min	max	
V_{CC}	Supply voltage	4.5	5.5	V
$V+$	Transmitter output high voltage	5.0	-	
$V-$	Transmitter output low voltage	-5.0	-	
V_{TIN}	Transmitter input voltage	0	V_{CC}	
V_{RIN}	Receiver input voltage	-30	30	
I_{SC}	Transmitter short circuit output current	-	± 60	mA
T_a	Ambient temperature	-40	85	$^{\circ}C$



Symbol	Parameter	Test conditions	Rate				Unit
			25°C		от -40 °C до 85 °C		
			min	max	min	max	
I_{CC}	Consumption current static	$V_{CC} = 5.5 \text{ V}$ $V_{IL} = 0 \text{ V}$	-	10.0	-	14.0*	mA
Receiver electrical parameters							
V_h	Hysteresis voltage	$V_{CC} = 5.0 \text{ V}$	0.2	0.9	0.2	1.0	V
V_{On}	On (operation) voltage	$V_O \leq 0.1 \text{ V}$ $I_{OL} \leq 20 \text{ mA}$	-	2.4	-	2.3	
V_{off}	Off (dropout) voltage	$V_O \geq V_{CC} - 0.1 \text{ V}$ $I_{OH} \leq -20 \text{ mA}$	0.8	-	0.9	-	
V_{OL}	Output low voltage	$I_{OL} = 3.2 \text{ mA}$ $V_{CC} = 4.5 \text{ V}$ $V_{IH} = 2.4 \text{ V}$	-	0.3	-	0.4	
V_{OH}	Output high voltage	$I_{OH} = -1.0 \text{ mA}$ $V_{CC} = 4.5 \text{ V}$ $V_{IL} = 0.8 \text{ V}$	3.6	-	3.5	-	
R_i	Input resistance	$V_{CC} = 5.0 \text{ V}$	3.0	7.0	3.0	7.0	kOhm
Transmitter electrical parameters							
V_{OL}	Output low voltage	$V_{CC} = 4.5 \text{ V}$ $V_{IH} = 2.0 \text{ V}$ $R_L = 3.0 \text{ kOhm}$	-	-5.2	-	-5.0	V
V_{OH}	Output high voltage	$V_{CC} = 4.5 \text{ V}$ $V_{IL} = 0.8 \text{ V}$ $R_L = 3.0 \text{ kOhm}$	5.2	-	5.0	-	
I_{IL}	Input low current	$V_{CC} = 5.5 \text{ V}$ $V_{IL} = 0 \text{ V}$	-	-1.0	-	-10.0	mA
I_{IH}	Input high current	$V_{CC} = 5.5 \text{ V}$ $V_{IH} = V_{CC}$		1.0		10.0	
SR	Speed of output front change	$V_{CC} = 5.0 \text{ V}$ $C_L = 50 - 1000 \text{ pF}$ $R_L = 3.0 - 7.0 \text{ kOhm}$	3.0	30	2.7	27	V/mks
R_O	Output resistance	$V_{CC} = V_+ = V_- = 0 \text{ V}$ $V_O = \pm 2 \text{ V}$	350	-	300	-	Ohm
I_{sc}	Short circuit output current	$V_{CC} = 5.5 \text{ V}$ $V_O = 0 \text{ V}$ $V_I = V_{CC}$ $V_I = 0 \text{ V}$		-50 50		-60 60	mA
ST	Speed of information transmission	$V_{CC} = 4.5 \text{ V}$ $C_L = 1000 \text{ pF}$ $R_L = 3.0 \text{ kOhm}$ $t_w = 7 \text{ mks}$ (for extreme - $t_w = 8 \text{ mks}$)	140	-	120	-	kbit/c

Symbol	Parameter	Test conditions	Rate				Unit
			25 °C		from -40 °C to 85 °C		
			min	max	min	max	
t_{PHLR} (t_{PLHR})	Signal propagation delay time when switching on (off)	$V_{CC} = 4.5\text{ V}$ $C_L = 150\text{ pF}$ $V_{IL} = 0\text{ V}$ $V_{IH} = 3.0\text{ V}$ $t_{LH} = t_{HL} \leq 10\text{ ns}$	-	9.7	-	10	mks
t_{PHLT} (t_{PLHT})	Signal propagation delay time when switching on (off)	$V_{CC} = 4.5\text{ V}$ $C_L = 2500\text{ pF}$ $V_{IL} = 0\text{ V}$ $V_{IH} = 3.0\text{ V}$ $R_L = 3\text{ kOhm}$ $t_{LH} = t_{HL} \leq 10\text{ ns}$		5.0*		6.0*	

Capacitance

Symbol	Parameter	V_{CC} , V	Rate	Unit
C_{IN}	Input capacitance	5.0	9.0	pF
C_{PD}	Dynamic capacitance		90	

Timing diagram when measuring IC dynamic parameters

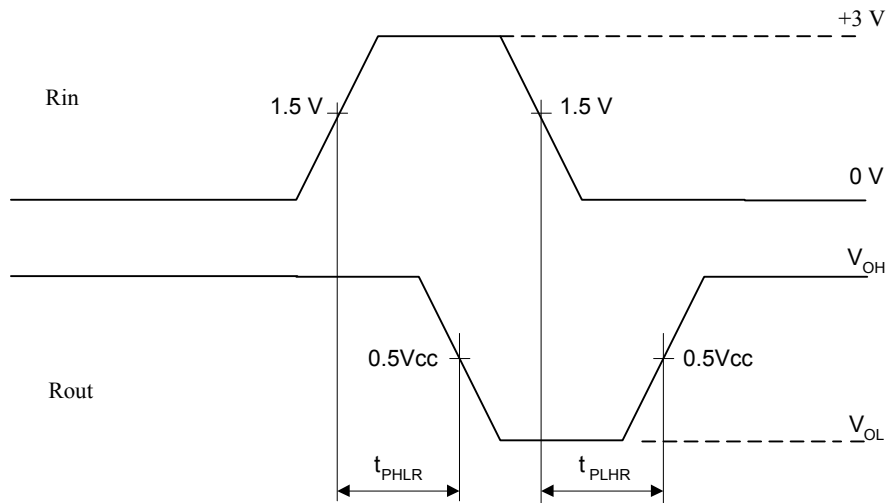


Figure 3

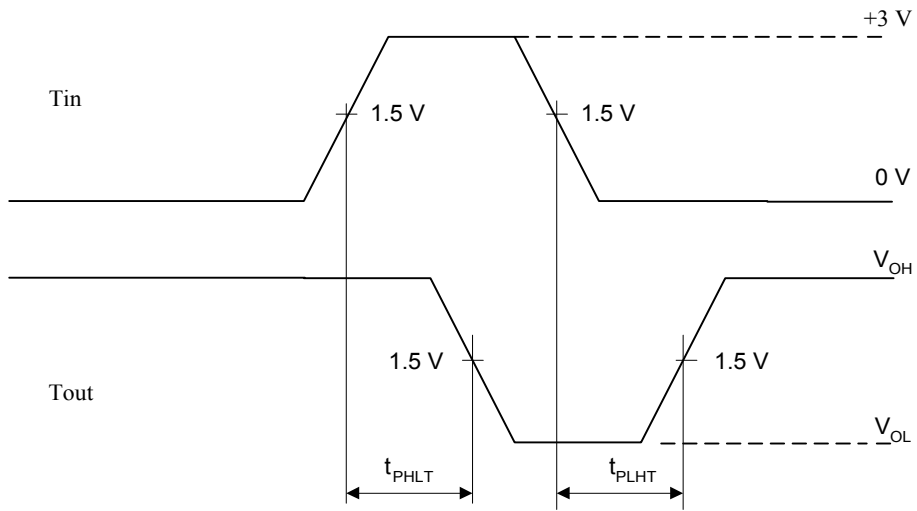


Figure 4

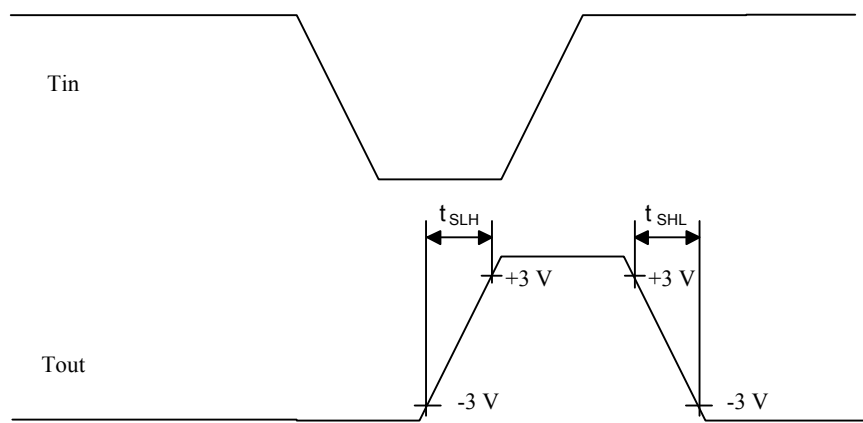


Figure 5

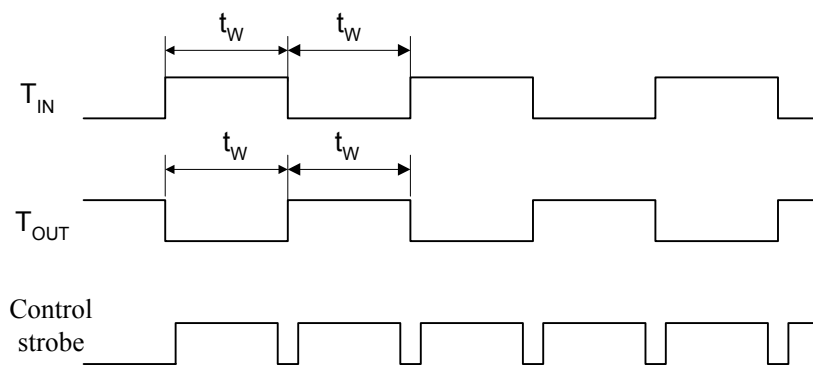


Figure 6