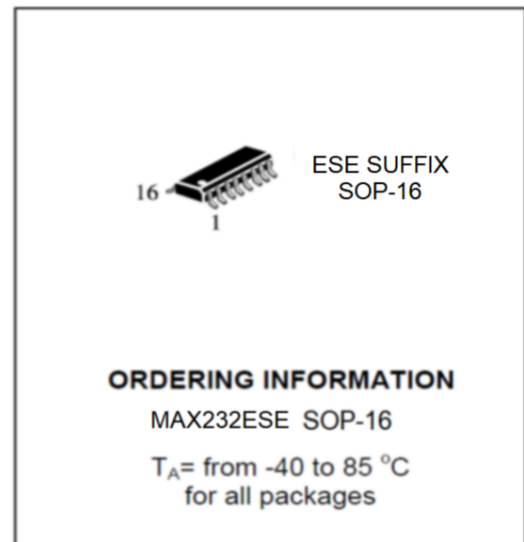


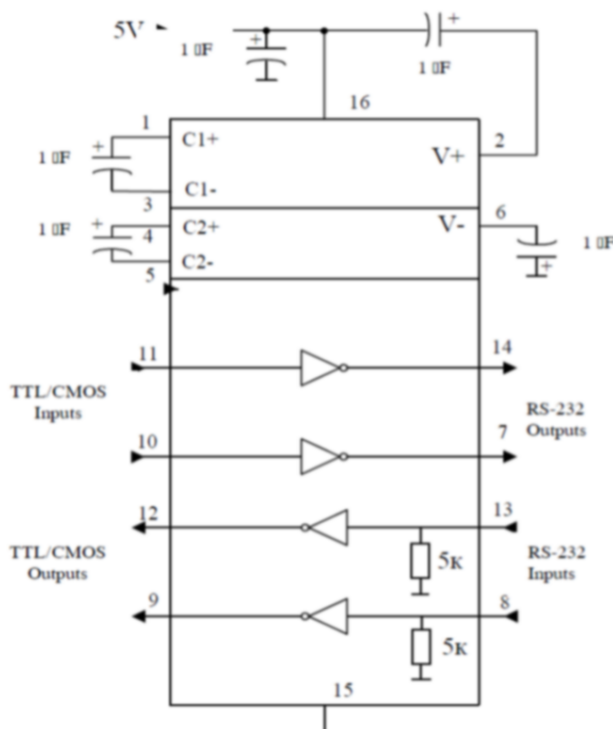
+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

The 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

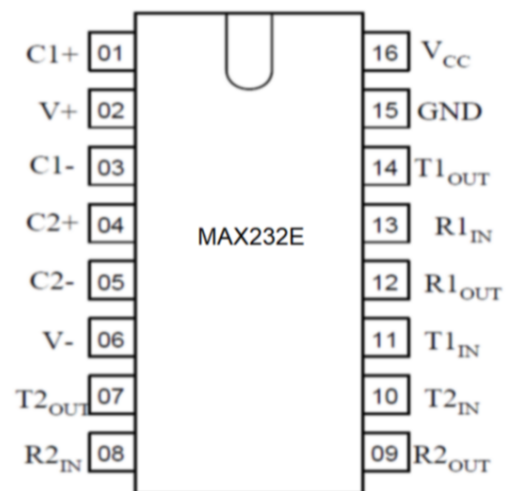
- Operate from Single +5 V Power Supply;
- Guaranteed 120 kbps Data Rate;
- Latchup Free;
- ESD Protection $\pm 2\text{kV}$



Typical Operating Circuit



Pin configuration



+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

Pin descriptions

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

Absolute 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	-14	+0.3	
V _{TIN}	Transmitter input voltage	-0.3	V _{CC} +0.3	
V _{RIN}	Receiver input voltage	-30	30	
V _{T OUT}	Output voltages (transmitters)	V ₋ -0.3	V ₊ +0.3	V
V _{R OUT}	Output voltages (receivers)	-0.3	V _{CC} +0.3	
P _D	Power dissipation DIP – package (derate 10.53 mW/°C above 70 °C) SO – package (derate 9.52 mW/°C above 70 °C)	-	842 762	mW
I _{SC}	Short-Circuit Duration (T _{out})	-	Continu- ous	
T _{stg}	Storage temperature	-60	150	°C
T _A	Operating voltage range	-40	85	°C

+5 V-Powered, Multi-Channel RS-232 Drivers/Receivers

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Conditions	Min	Max	Units
DC CHARACTERISTICS					
V_{CC}	Operating Voltage Range	$V_{IL}=0V$	4.5	5.5	V
I_{CC}	V_{CC} Supply Current	No load, $T_A = 25^\circ C$		10.0	mA
LOGIC					
I_I	Input Leakage Current	$T_{IN} = 0V$ to V_{CC}	0.2	± 10	μA
V_{IL}	Input Threshold Low	T_{IN}		0.8	V
V_{IH}	Input Threshold High	T_{IN}	2.0		V
V_{OL}	Output Voltage Low	R_{OUT} ; $I_{OUT} = 3.2mA$		0.4	V
V_{OH}	Output Voltage High	R_{OUT} ; $I_{OUT} = -1.0mA$	3.5		V
RECEIVER INPUTS					
V_{RIN}	Input Voltage Range	All parts, normal operation	-30	+30	V
V_{ff}	Input Threshold Low	$T_A = +25^\circ C$, $V_{CC}=5V$	0.8		V
I_{on}	Input Threshold High	$T_A = +25^\circ C$, $V_{CC}=5V$	-	2.4	V
V_h	Input Hysteresis	$V_{CC} = 5V$	0.2	1.0	V
R_I	Input Resistance	$T_A = +25^\circ C$, $V_{CC}=5V$	3	7	k Ω
TRANSMITTER OUTPUTS					
ΔV_O	Output Voltage Swing	All driver inputs loaded with $3k\Omega$ to ground	± 5.0		V
R_O	Output resistance	$V_{CC}=V+=V-=0V$; $V_{OUT}=\pm 2V$	300		Ω
I_{SC}	Output Short-Circuit Current			± 60	mA
TIMING CHARACTERISTICS					
ST	Maximum Data Rate	$R_L=3.0k\Omega$ to $7k\Omega$, $C_L=50pF$ to $1000pF$, one transmitter switching	120		kbps
t_{PLHR} , t_{PHLR}	Receiver Propagation Delay	$C_L = 150pF$ All parts, normal operation (Fig. 1)		10	μS
t_{PLHT} , t_{PHLT}	Transmitter Propagation Delay	$R_L=3.0k\Omega$, $C_L=2500pF$, all transmitters loaded (Fig. 2)		6.0	μS
SR	Transition-Region Slew Rate	$T_A = 25^\circ C$, $V_{CC} = 5V$, $R_L=3.0k\Omega$ to $7k\Omega$, $C_L=50pF$ to $2500pF$, measured from $-3V$ to $+3V$ or $+3V$ to $-3V$ (Fig. 3)	3	30	V/ μS

Timing diagram

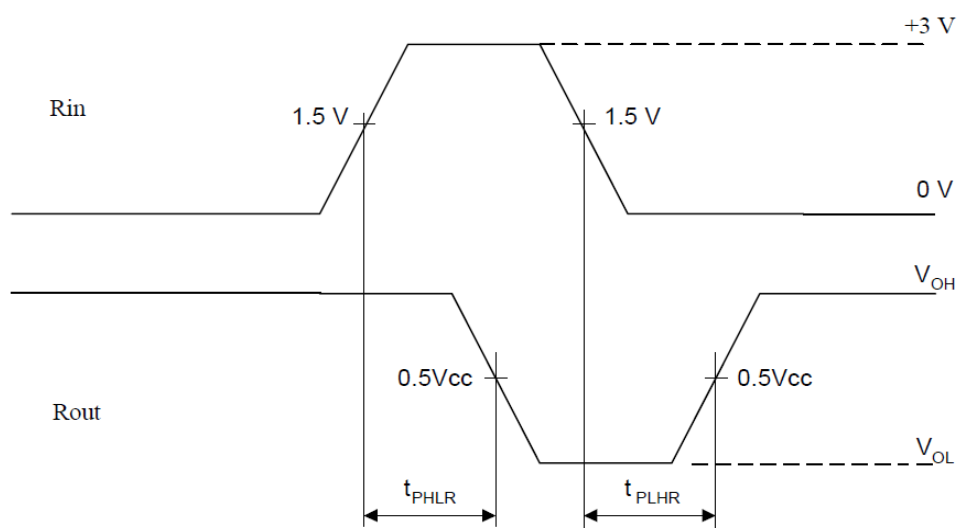


Figure 1

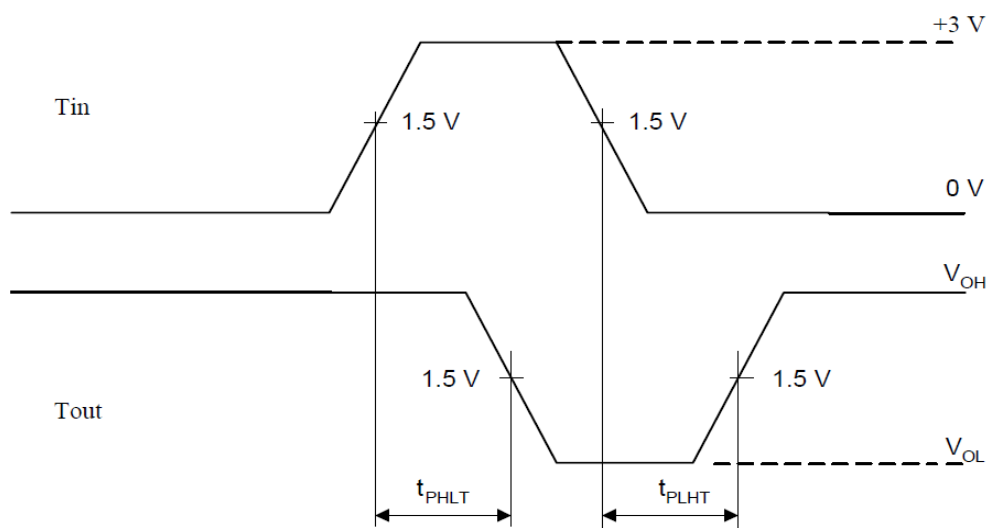


Figure 2

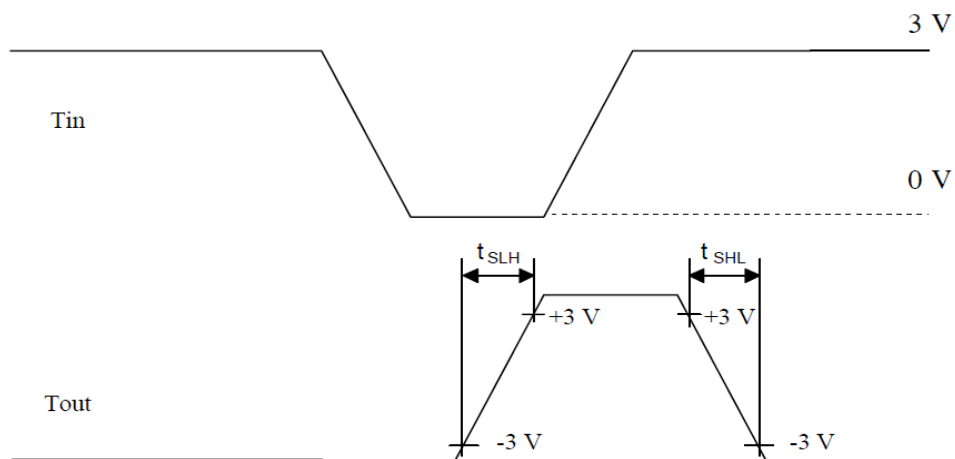
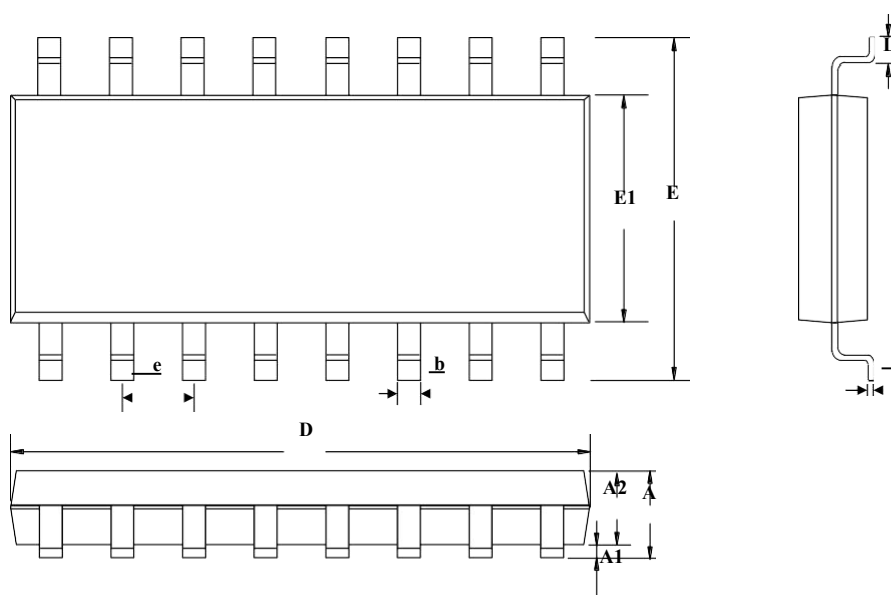


Figure 3

PACKAGE OUTLINE

SOP-16
UNIT:mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.80
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
b	0.33	—	0.51
c	0.17	—	0.25
D	9.50	—	10.20
E	5.80	6.00	6.20
E1	3.70	—	4.10
e	1.27BSC		
L	0.45	0.60	0.80

Ordering information

Order code	Package	Baseqty	Deliverymode	Operating temperature range
UMW MAX232ESE	SOP-16	2500	Tape and reel	-40° - +85°