


+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

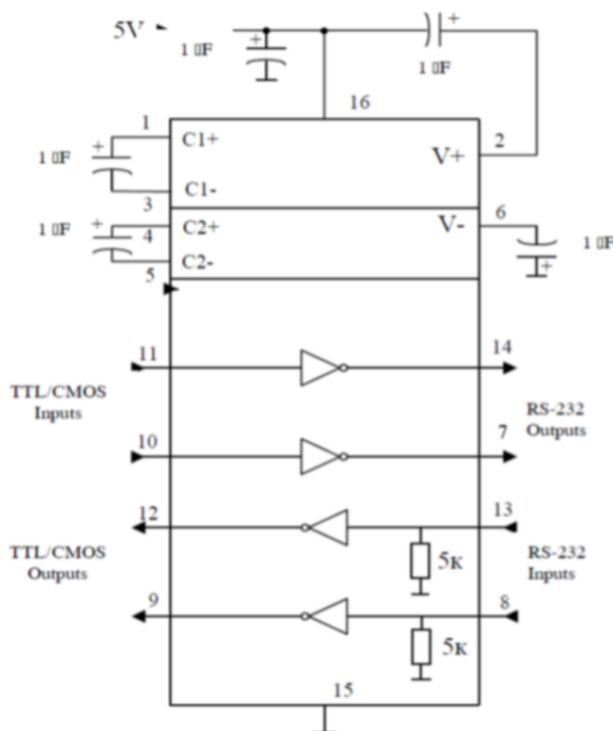
- Operate from Single +5 V Power Supply;
- Guaranteed 120 kbps Data Rate;
- Latchup Free;
- ESD Protection $\pm 2kV$



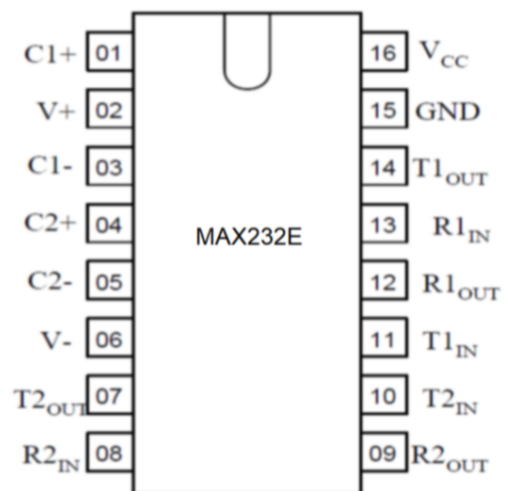
ESE SUFFIX
SOP-16

ORDERING INFORMATION
MAX232ESE SOP-16
 $T_A =$ from -40 to 85 °C
for all packages

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 _{TOUT}	Output voltages (transmitters)	V ₋ -0.3	V ₊ +0.3	V
V _{ROUT}	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

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ELECTRICAL CHARACTERISTICS

 (V_{CC} = 4.5V to 5.5V, C1-C4 = 1μF; T_A = -40 to +85°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°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°C, V _{CC} =5V	0.8		V
I _{on}	Input Threshold High	T _A = +25°C, V _{CC} =5V	-	2.4	V
V _h	Input Hysteresis	V _{CC} = 5 V	0.2	1.0	V
R _I	Input Resistance	T _A = +25°C, V _{CC} =5V	3	7	kΩ
TRANSMITTER OUTPUTS					
Δ V _O	Output Voltage Swing	All driver inputs loaded with 3kΩ to ground	±5.0		V
R _O	Output resistance	V _{CC} =V+=V-=0V; V _{OUT} =±2V	300		Ω
I _{SC}	Output Short-Circuit Current			±60	mA
TIMING CHARACTERISTICS					
ST	Maximum Data Rate	R _L =3.0kΩ to 7 kΩ, 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 =3.0kΩ, C _L =2500pF, all transmitters loaded (Fig. 2)		6.0	μS
SR	Transition-Region Slew Rate	T _A = 25°C, V _{CC} = 5V, R _L =3.0kΩ to 7 kΩ, C _L =50pF to 2500pF, measured from -3V to +3V or +3V to -3V (Fig. 3)	3	30	V/μS

Timing diagram

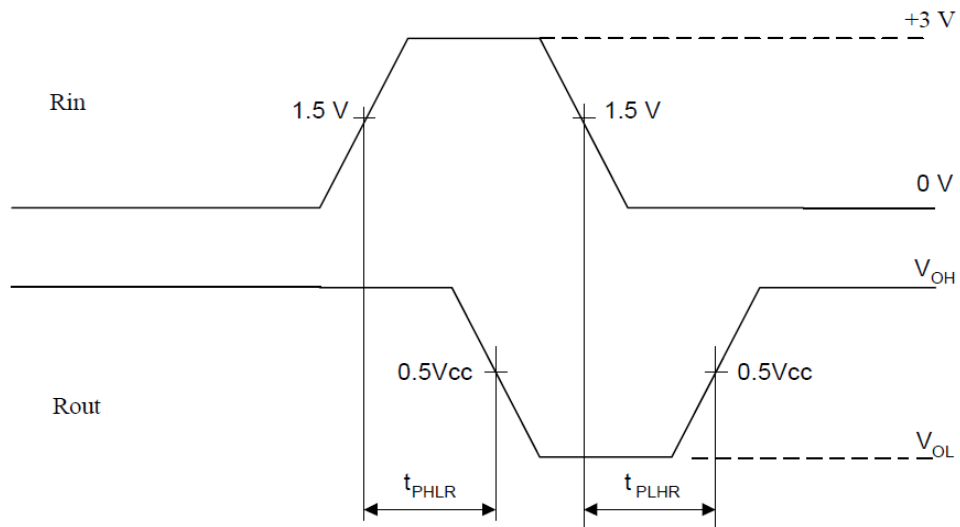


Figure 1

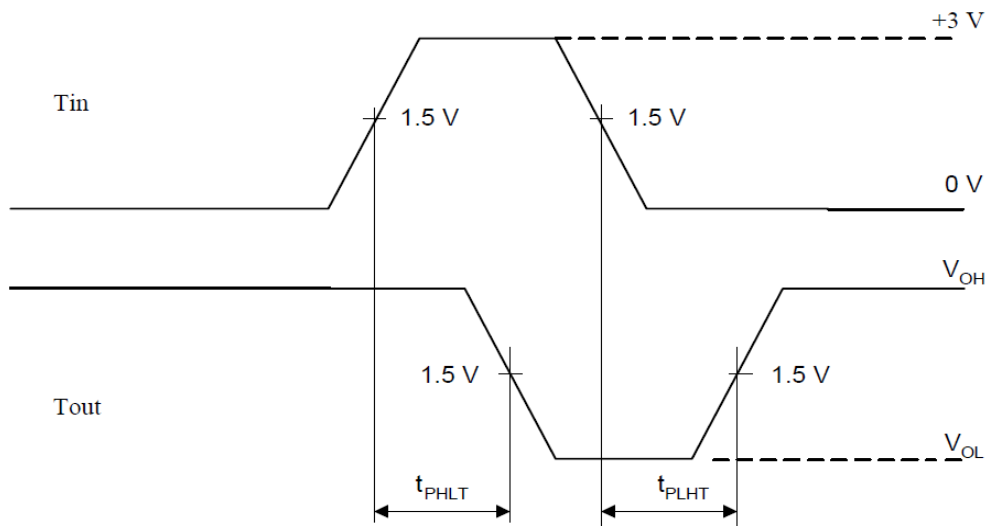


Figure 2

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

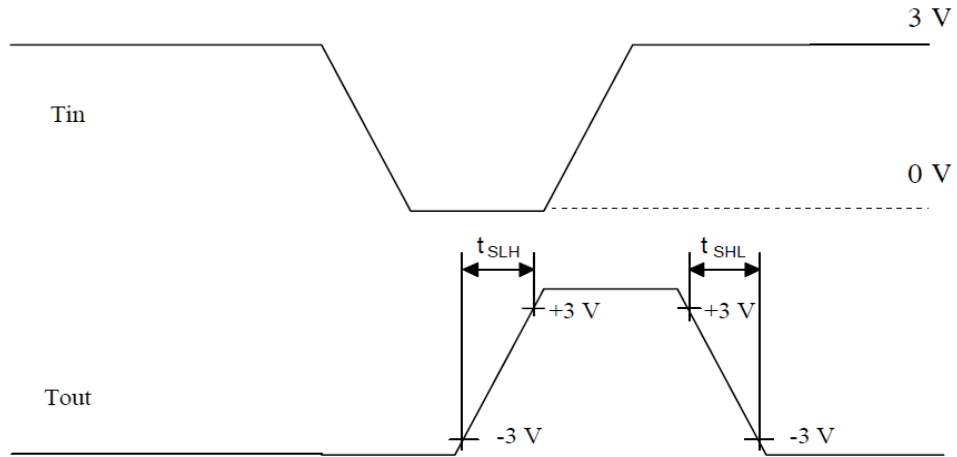
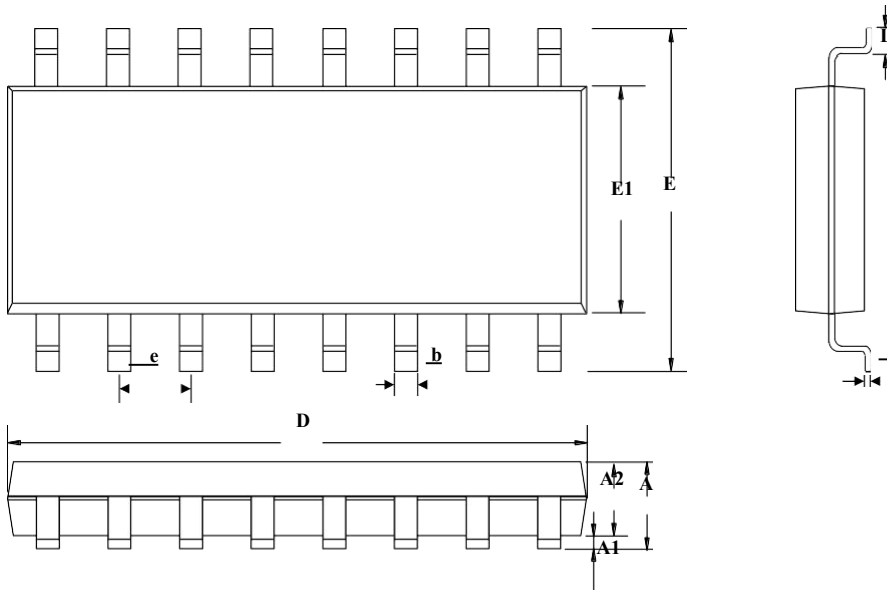


Figure 3

PACKAGE OUTLINE



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

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