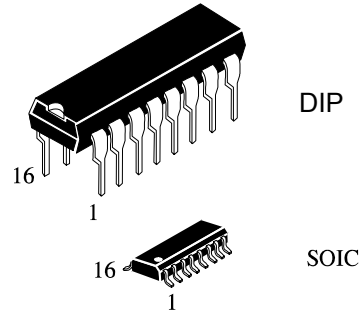


## Interface transceiver of RS-232 standard with one supply voltage

IC HGX232 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

HGX232EXN DIP

HGX232EXM SOIC

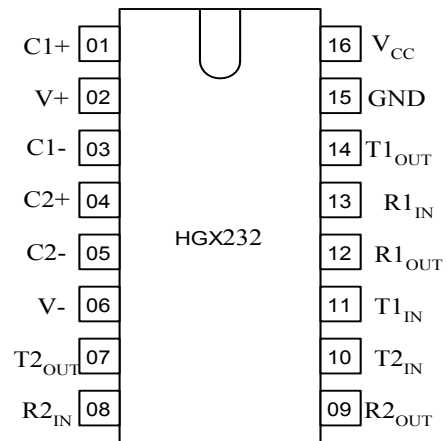
### Truth table

Inputs	Outputs
R <sub>IN</sub> , T <sub>IN</sub>	R <sub>OVT</sub> , T <sub>OVT</sub>
H	L
L	H

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

For all packages

### Pin symbols in package



### ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
HGX232ECN	DIP16L	HGX232	TUBE	1000pcs/box
HGX232ECM/TR	SOP16L	HGX232	REEL	2500pcs/reel
HGX232EIN	DIP16L	HGX232	TUBE	1000pcs/box
HGX232EIM/TR	SOP16L	HGX232	REEL	2500pcs/reel

**Table of pin description**

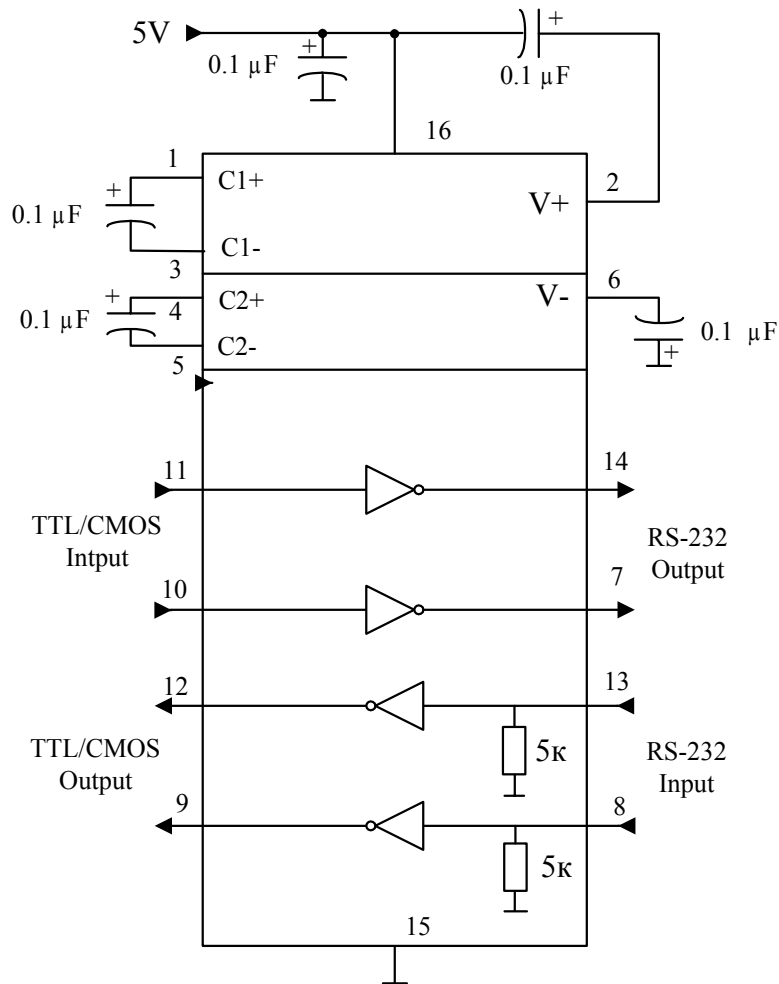
Pin No.	Symbol	Pin name
01	C1+	Output of external capacitance of positive voltage multiplier unit
02	V+	Output of positive voltage of multiplier unit
03	C1-	Output of external capacitance of positive voltage multiplier unit
04	C2+	Output of external capacitance of negative voltage multiplier unit
05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

**Maximum conditions**

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

**Absolute maximum conditions**

Symbol	Parameter	Rate		Unit	
		min	max		
V <sub>CC</sub>	Supply voltage	4.5	5.5	V	
V <sub>+</sub>	Transmitter output high voltage	5.0	-		
V <sub>-</sub>	Transmitter output low voltage	-5.0	-		
V <sub>TIN</sub>	Transmitter input voltage	0	V <sub>CC</sub>		
V <sub>RIN</sub>	Receiver input voltage	-30	30		
I <sub>SC</sub>	Transmitter short circuit output current	-	±60	mA	
T <sub>a</sub>	Ambient temperature	HGX232EC	0	70	°C
		HGX232EI	-40	85	



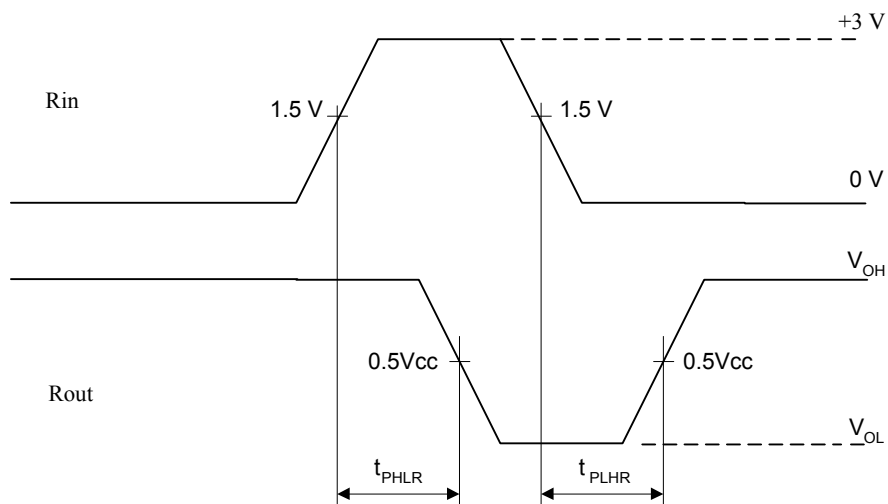
Symbol	Parameter	Test conditions	Rate				Unit
			25°C		от -40 °C до 85 °C		
			min	max	min	max	
$I_{CC}$	Consumption current static	$V_{CC} = 5.5 \text{ V}$ $V_{IL} = 0 \text{ V}$	-	10.0	-	14.0*	mA
<b>Receiver electrical parameters</b>							
$V_h$	Hysteresis voltage	$V_{CC} = 5.0 \text{ V}$	0.2	0.9	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
<b>Transmitter electrical parameters</b>							
$V_{OL}$	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)	$V_{CC} = 4.5 V$ $C_L = 150 pF$ $V_{IL} = 0 V$ $V_{IH} = 3.0 V$ $t_{LH} = t_{HL} \leq 10 ns$	-	9.7	-	10	mks
$t_{PHLT}$ ( $t_{PLHT}$ )	Signal propagation delay time when switching on (off)	$V_{CC} = 4.5 V$ $C_L = 2500 pF$ $V_{IL} = 0 V$ $V_{IH} = 3.0 V$ $R_L = 3 k\Omega$ $t_{LH} = t_{HL} \leq 10 ns$		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**

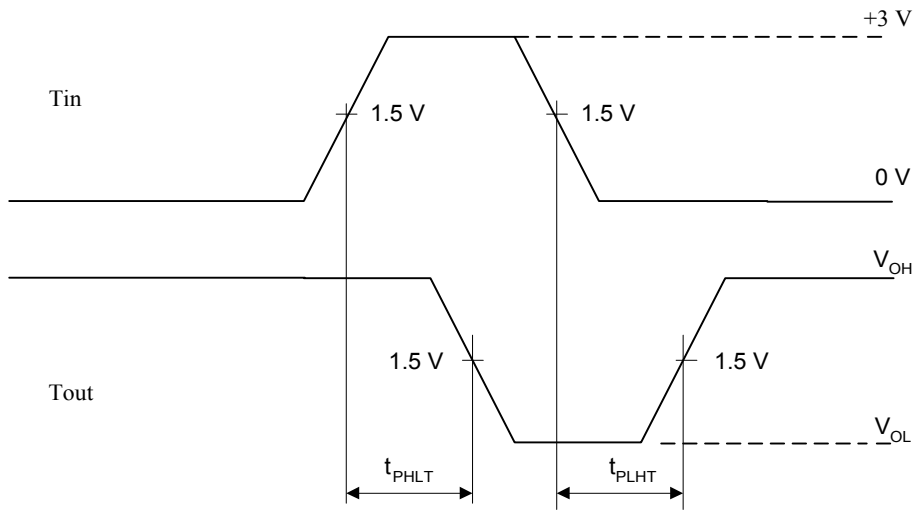


Figure 4

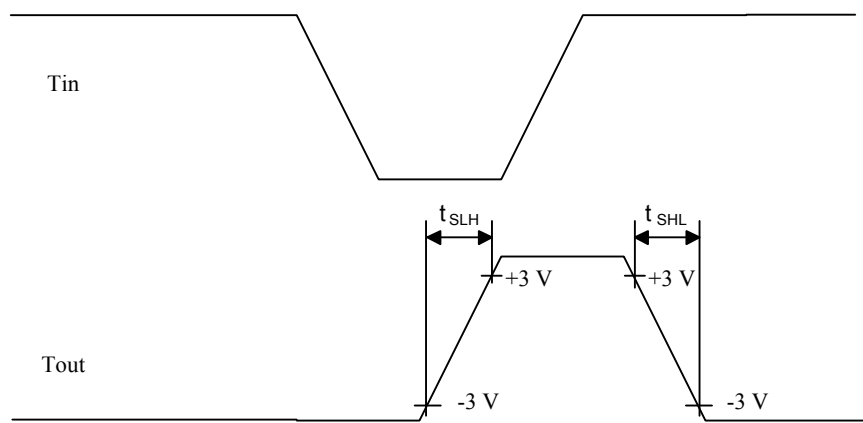


Figure 5

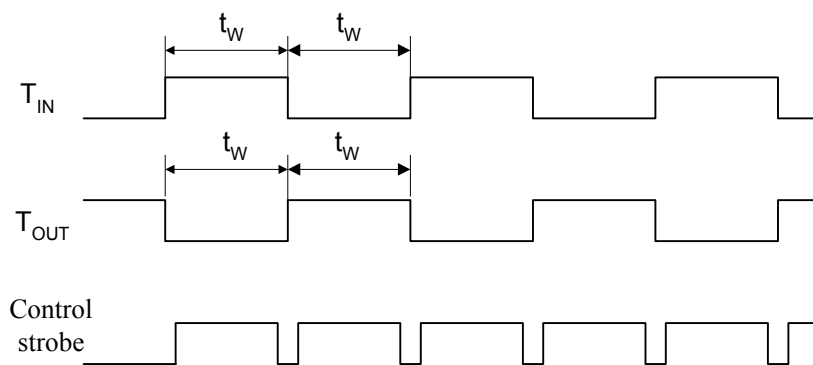
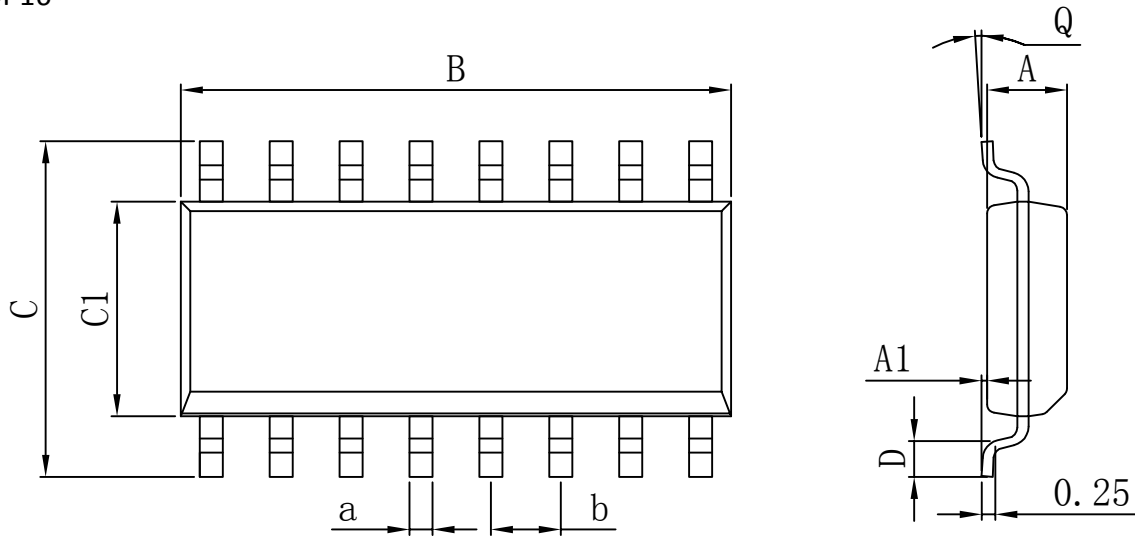


Figure 6

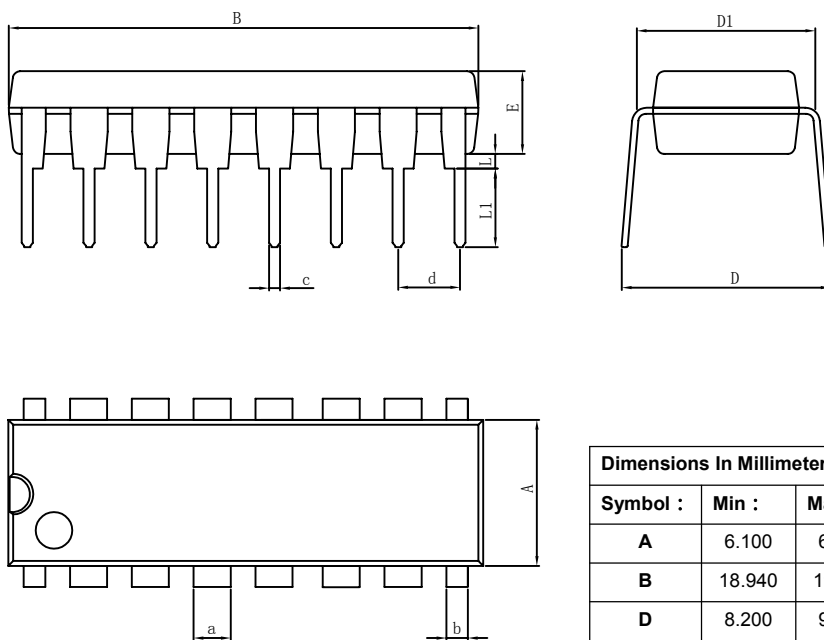
**PACKAGE**

**SOP16**



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	1.225	1.570	D	0.400	0.950
A1	0.100	0.250	Q	0°	8°
B	9.800	10.00	a	0.420 TYP	
C	5.800	6.250	b	1.270 TYP	
C1	3.800	4.000			

**DIP16**



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	6.100	6.680	L	0.500	0.800
B	18.940	19.560	a	1.524 TYP	
D	8.200	9.200	b	0.889 TYP	
D1	7.42	7.820	c	0.457 TYP	
E	3.100	3.550	d	2.540 TYP	
L	0.500	0.800			

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