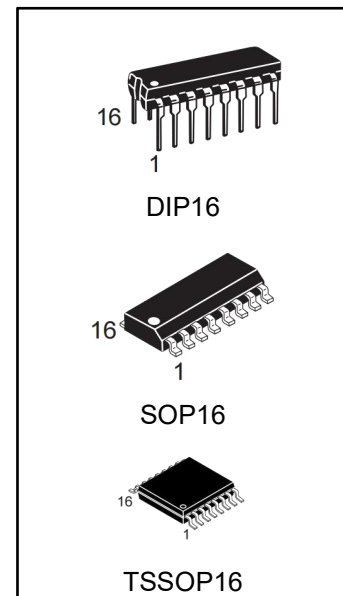


INTERFACE TRANSCEIVER OF RS-232 STANDARD WITH ONE SUPPLY VOLTAGE

DESCRIPTION

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 Ta= 25°C
- Output current 24 mA.
- Latching current not less than 450 mA at Ta= 25°C
- Tolerable value of static potential not less than 2000V



ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
HGX232ECN	DIP16	HGX232	TUBE	1000pcs/box
HGX232ECM/TR	SOP16	HGX232	REEL	2500pcs/reel
HGX232ECMT/TR	TSSOP16	HGX232	REEL	2500pcs/reel
HGX232EIN	DIP16	HGX232	TUBE	1000pcs/box
HGX232EIM/TR	SOP16	HGX232	REEL	2500pcs/reel
HGX232EIMT/TR	TSSOP16	HGX232	REEL	2500pcs/reel

Pin symbols in package

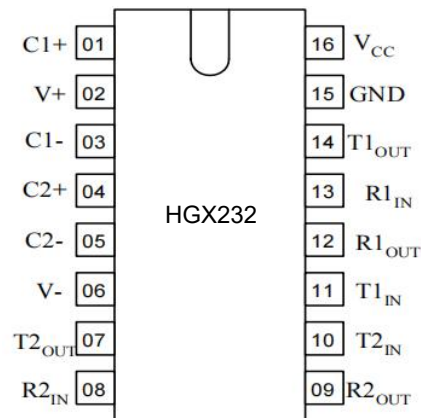


Table of pin description

	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

Truth table

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

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

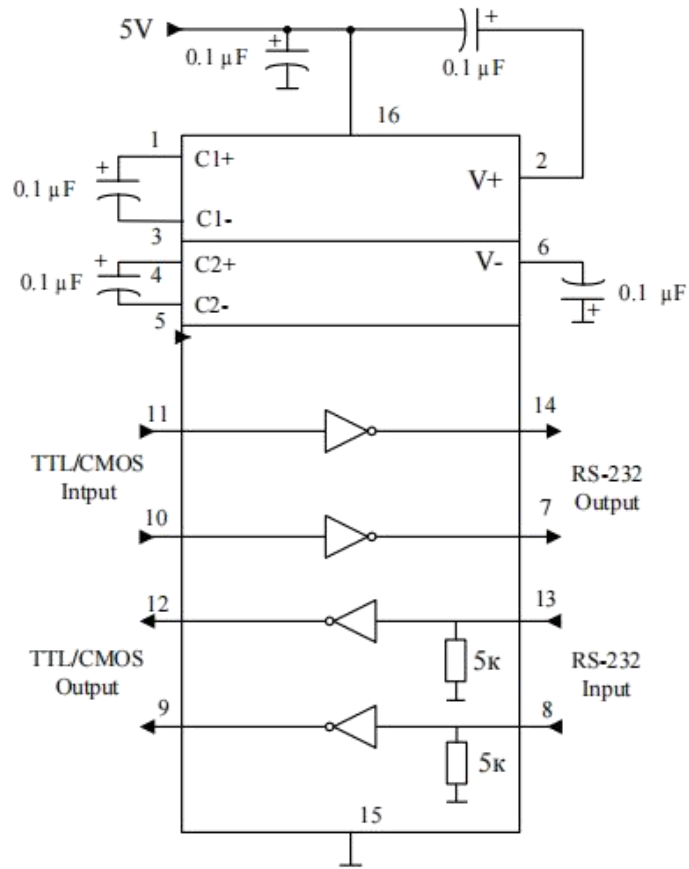
Maximum conditions

Symbol	Parameter	Rate		Unit
		min	max	
VCC	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	
VTIN	Transmitter input voltage	-0.3	V+ +0.3	
VRIN	Receiver input voltage	-30	30	
P _D	Dissipated power	-		mW
	DIP – package		842	
	SOP - package		762	
ISC	Output current of transmitter short circuit	-	Continu-ously	mA
Ta	Ambient temperature	-60	150	°C

Recommended Operating Conditions

Symbol	Parameter	Rate		Unit	
		min	max		
VCC	Supply voltage	4.5	5.5	V	
V+	Transmitter output high voltage	5.0	-		
V-	Transmitter output low voltage	-5.0	-		
VTIN	Transmitter input voltage	0	VCC		
VRIN	Receiver input voltage	-30	30		
ISC	Transmitter short circuit output current	-	±60	mA	
Ta	Ambient temperature	HGX232EC	0	70	°C
		HGX232EI	-40	85	

TYPICAL APPLICATION



ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-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} ≤ 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 kOhm t _{LH} = t _{HL} ≤ 10 ns	-	5.0*	-	6.0*	

Capacitance

Symbol	Parameter	V _{CC} , V	Rate	Unit
C _{IN}	Input capacitance	5.0	9.0	pF
CPD	Dynamic capacitance		90	

Timing diagram when measuring IC dynamic parameters

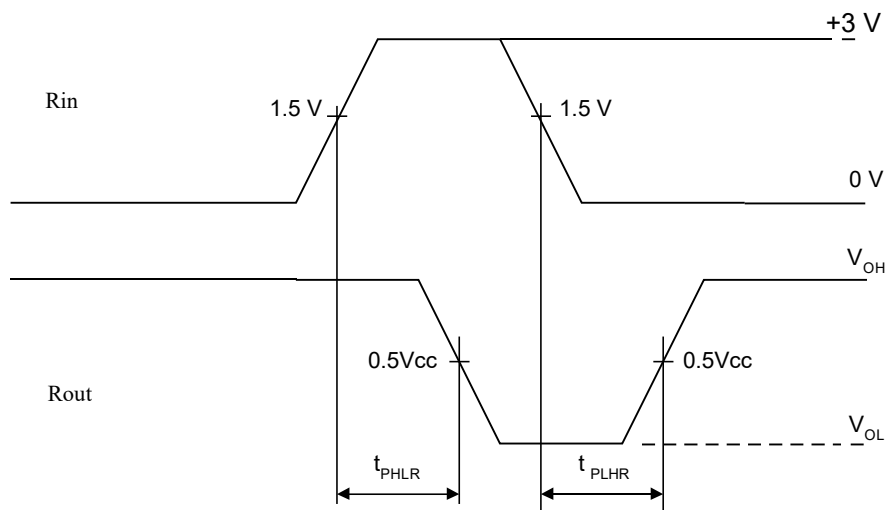


Figure 3

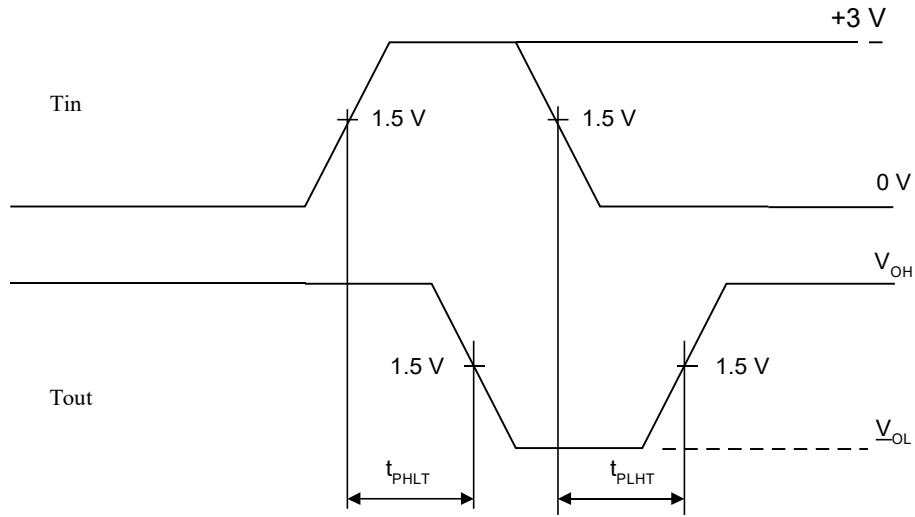


Figure 4

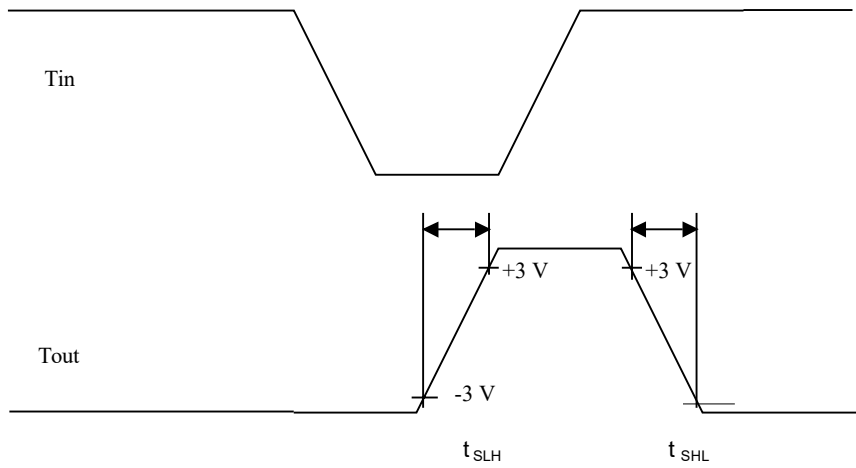


Figure 5

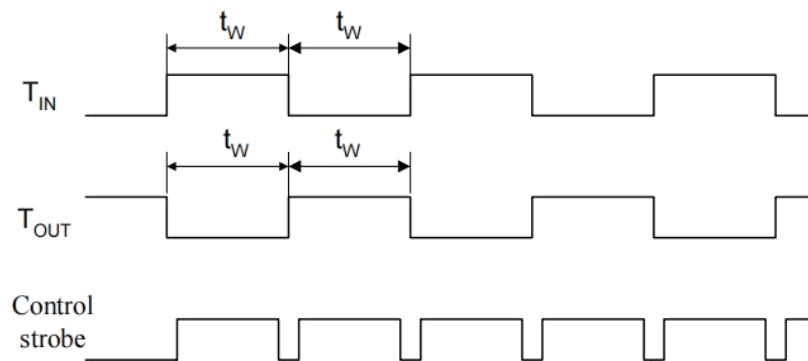
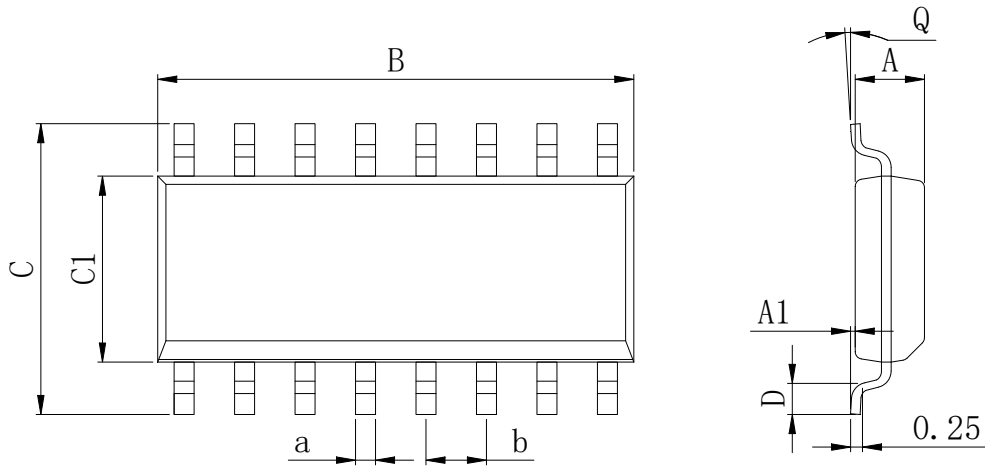


Figure 6

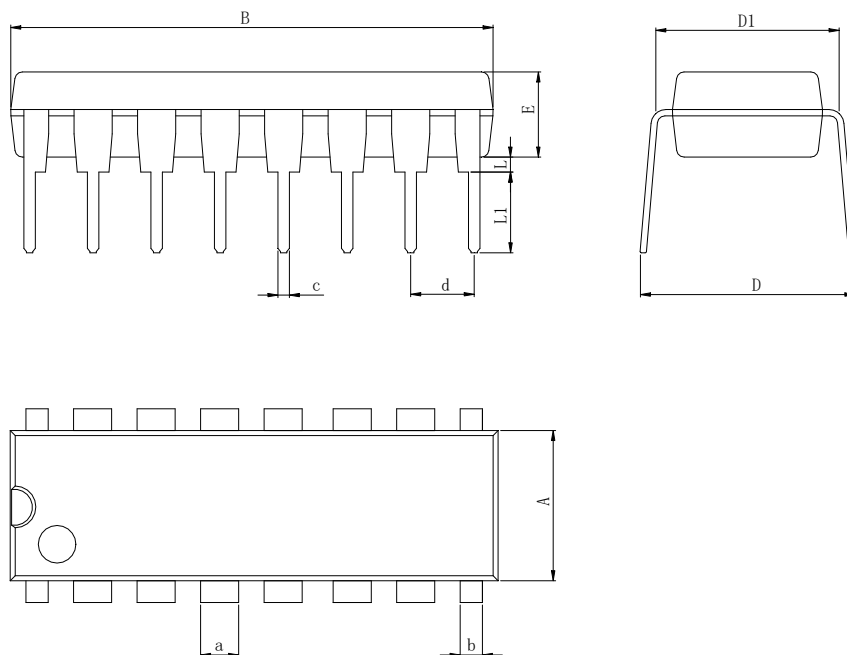
Physical Dimensions

SOP16



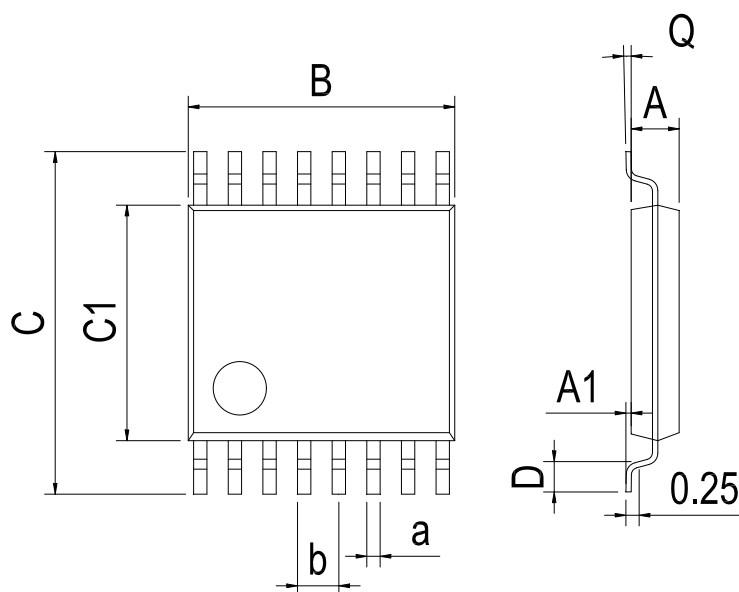
Dimensions In Millimeters(SOP16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45	

DIP16



Dimensions In Millimeters(DIP16)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

TSSOP16



Dimensions In Millimeters(TSSOP16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

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