

+5V-Powered, Multichannel RS-232 Drivers / Receivers

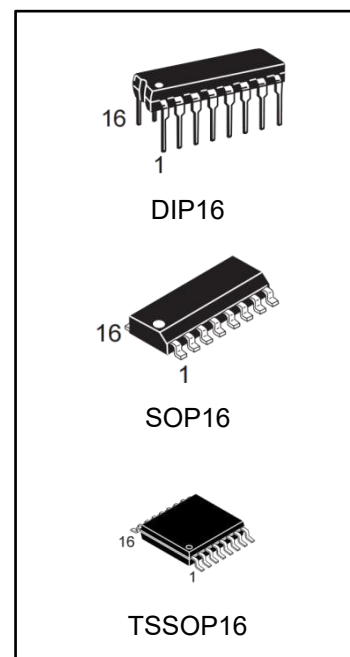
General Description

SP232E 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.

Features

- Output voltage levels are compatible with input levels of K-MOS, N-MOS and TTL integrated circuits.
- Supply voltage : 5V
- Low input current: 1.0 μ A; 0.1 μ A at Ta= 25 °C.
- Output current 24 mA.
- Latching current not less than 450 mA at Ta= 25°C
- The transmitter outputs and receiver inputs are protected to ± 15 kV Air ESD.



Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
SP232EIN	DIP16	SP232E	TUBE	1000pcs/Box
SP232EIM/TR	SOP16	SP232E	REEL	2500pcs/Reel
SP232EIMT/TR	TSSOP16	SP232E	REEL	2500pcs/Reel

Pin symbols in package

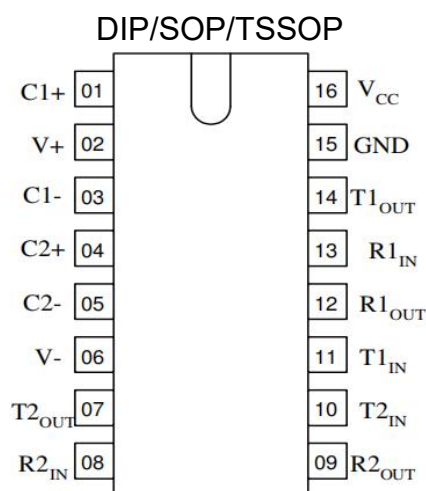


Table of pin description

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

Truth table

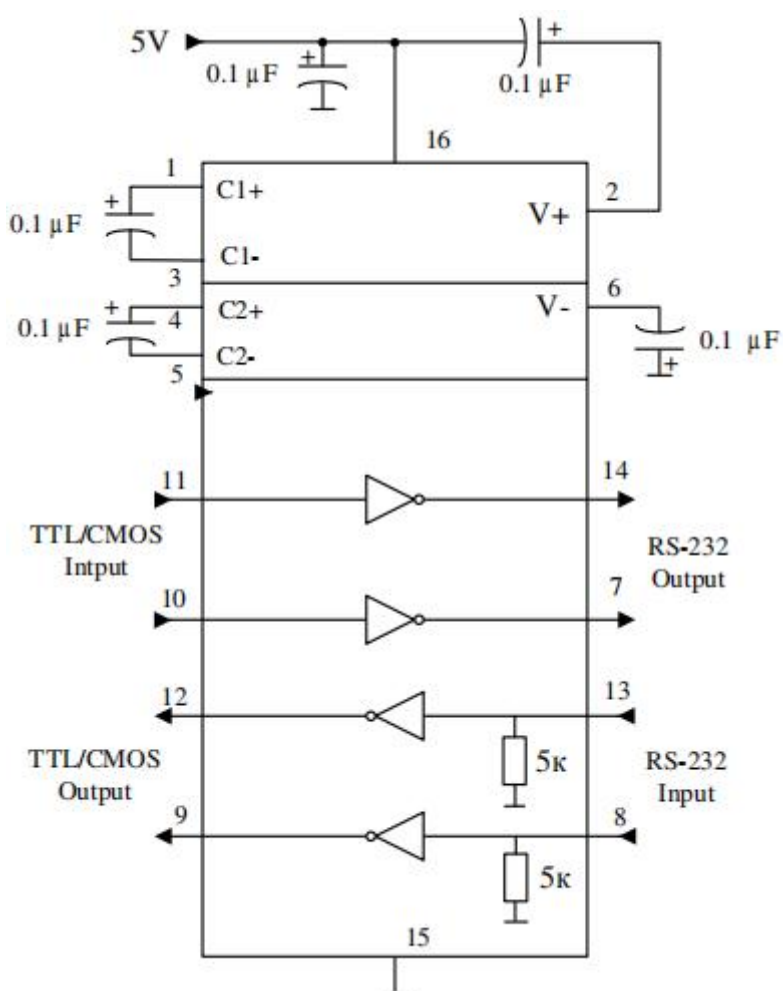
Inputs	Outputs
R_{IN}, T_{IN}	R_{OVT}, T_{OVT}
H	L
L	H
Note - H – voltage high level; L – low voltage level	

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	mW
	DIP – package			
	SOP - package		762	
I_{SC}	Output current of transmitter short circuit	-	Continuously	mA
T_a	Ambient temperature	-60	150	°C

Recommended Operating 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	$^{\circ}\text{C}$



Static parameters

Symbol	Parameter	Test conditions	Rate				Unit
			25℃		-40 ℃ to 85 ℃		
			min	max	min	max	
I _{CC}	Consumption current static	V _{CC} =5.0V V _{IL} = 0V	-	10.0	-	14.0	mA
Receiver electrical parameters							
V _h	Hysteresis voltage	V _{CC} =5.0V	0.2	0.9	0.2	1.0	V
V _{On}	On (operation) voltage	V _O ≤ 0.1 V I _{OL} ≤ 20 uA	-	2.4	-	2.3	
V _{off}	Off (dropout) voltage	V _O ≥ V _{CC} -0.1V I _{OH} ≤ -20 uA	0.8	-	0.9	-	
V _{OL}	Output low voltage	I _{OL} = 3.2 mA V _{CC} = 4.5 V V _{IH} = 2.4 V	-	0.3	-	0.4	
V _{OH}	Output high voltage	I _{OH} = -1.0 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 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 kOhm	5.2	-	5.0	-	
I _{IL}	Input low current	V _{CC} =5.5 V V _{IL} = 0 V	-	-1.0	-	-10.0	uA
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 pF R _L = 3.0 - 7.0 kOhm	3.0	30	2.7	27	V/μs
R _O	Output resistance	V _{CC} = V ₊ = V ₋ = 0 V V _O = ± 2 V	350	-	300	-	Ohm
I _{sc}	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 pF R _L = 3.0 kOhm t _W = 7us (for extreme -t _W = 8us)	140	-	120	-	

Dynamic parameters

Symbol	Parameter	Test conditions	Rate				Unit
			25°C		from -40°C to 85°C		
			min	max	min	max	
tPHLR (tPLHR)	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	us
tphlt (tPLHT)	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}	Rate	Unit
C _{IN}	Input capacitance	5.0	9.0	pF
CPD	Dynamic capacitance		90	

Timing diagram when measuring IC dynamic parameters

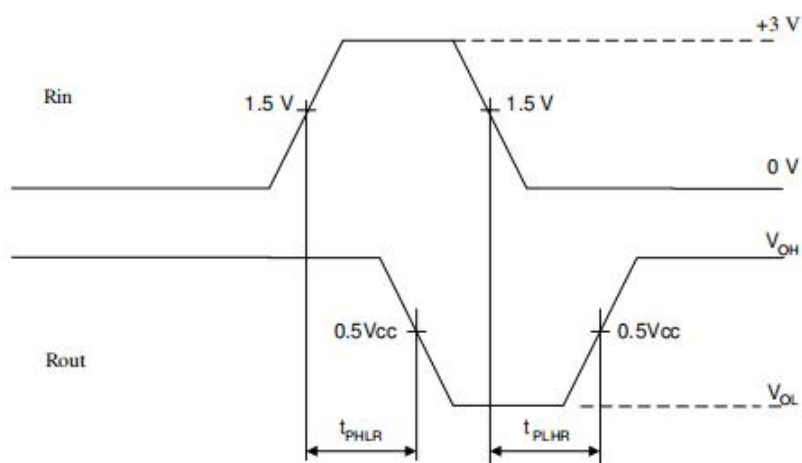


Figure 3

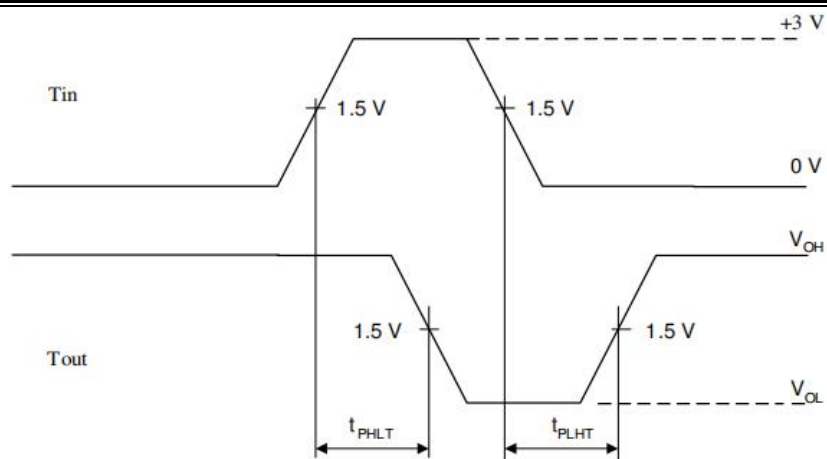


Figure 4

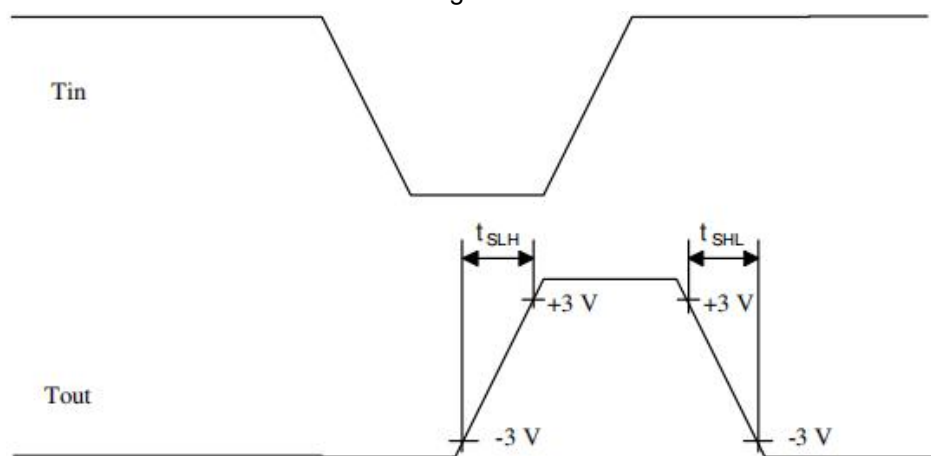


Figure 5

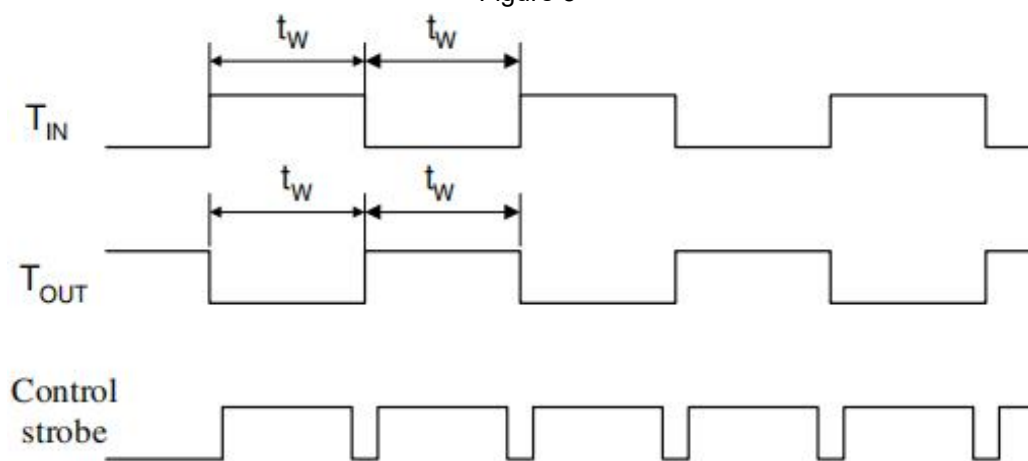
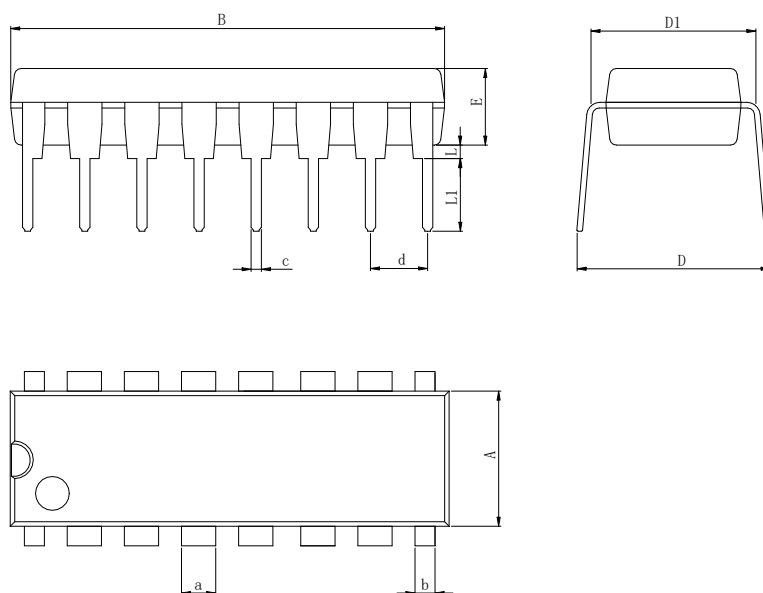


Figure 6

Physical Dimensions

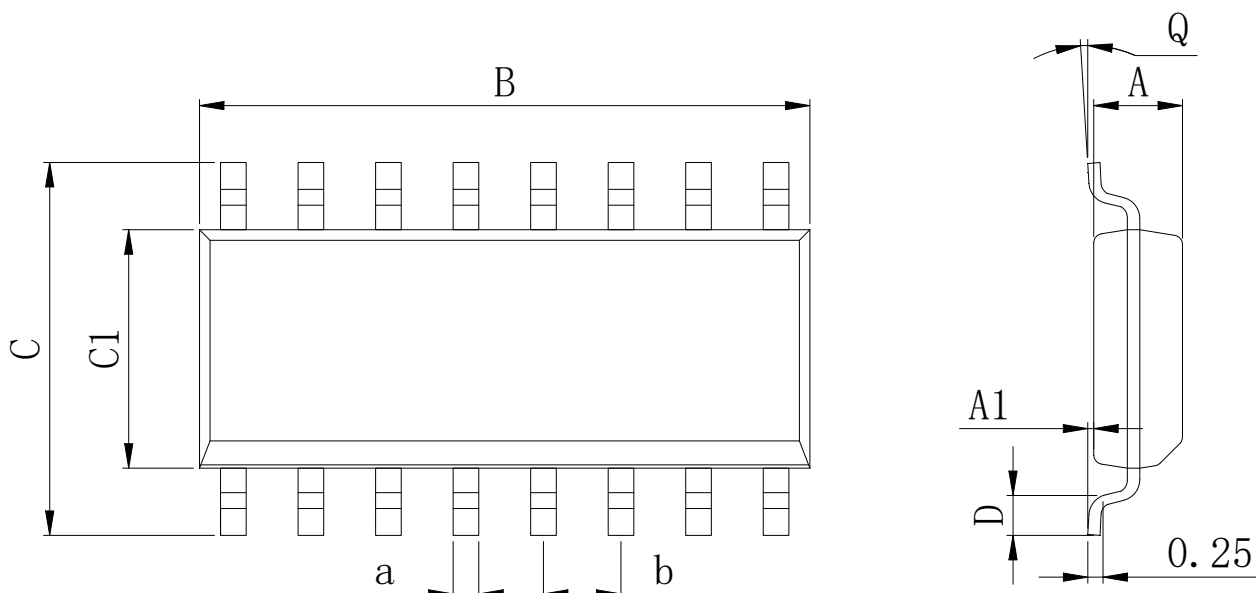
DIP16



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	300	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	

SOP16

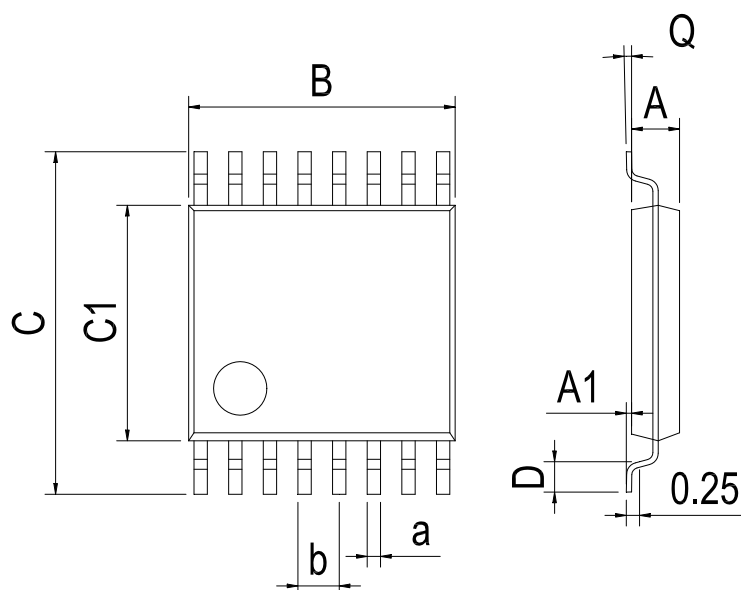


Dimensions In Millimeters(SOP16)

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	

Physical Dimensions

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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