

Interface transceiver of RS-232 standard with one supply voltage

■ Description

IC TK220 is purposed for application in high-performance information processing systems and control devices of wide application. It is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where $\pm 12V$ is not available.

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 μA ; 0.1 μA at T = 25 °C
- Ultra-low-power, industry-standard pinout
- Output current 24 mA
- Latching current not less than 450 mA at T = 25°C
- Enhanced ESD Specifications:
 $\pm 15kV$ IEC61000-4-2 Air Discharge
 $\pm 8kV$ IEC61000-4-2 Contact Discharge

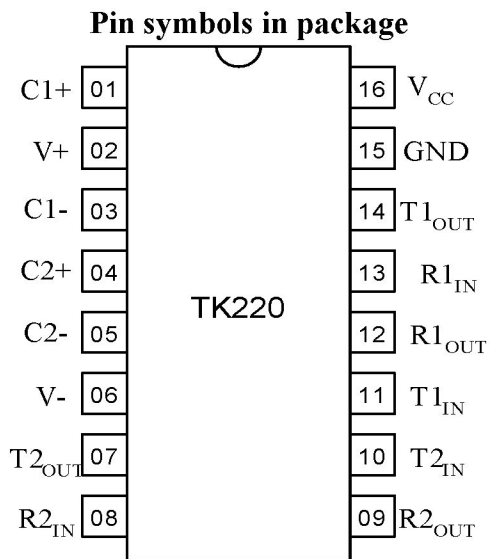
■ Applications

- Interface Translation
- Multidrop RS-232 Networks
- Portable Diagnostics Equipment

■ ORDERING INFORMATION

Part Number	Package	Packing	Temperature(TA)	Package Qty	ESD
TK220CSE	SOIC-16	Reel	0°C ~ 70°C	2500	$\pm 15kV$
TK220ESE	SOIC-16	Reel	-40°C ~ 85°C	2500	$\pm 15kV$

Note: Please contact us to customize DIP packaging device.

■ Pin Assignment

■ 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

■ 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

■ 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			mW
	SO - package	-	762	
I_{SC}	Output current of transmitter short circuit	-	Continuously	mA
T_a	Ambient temperature	-40	85	°C

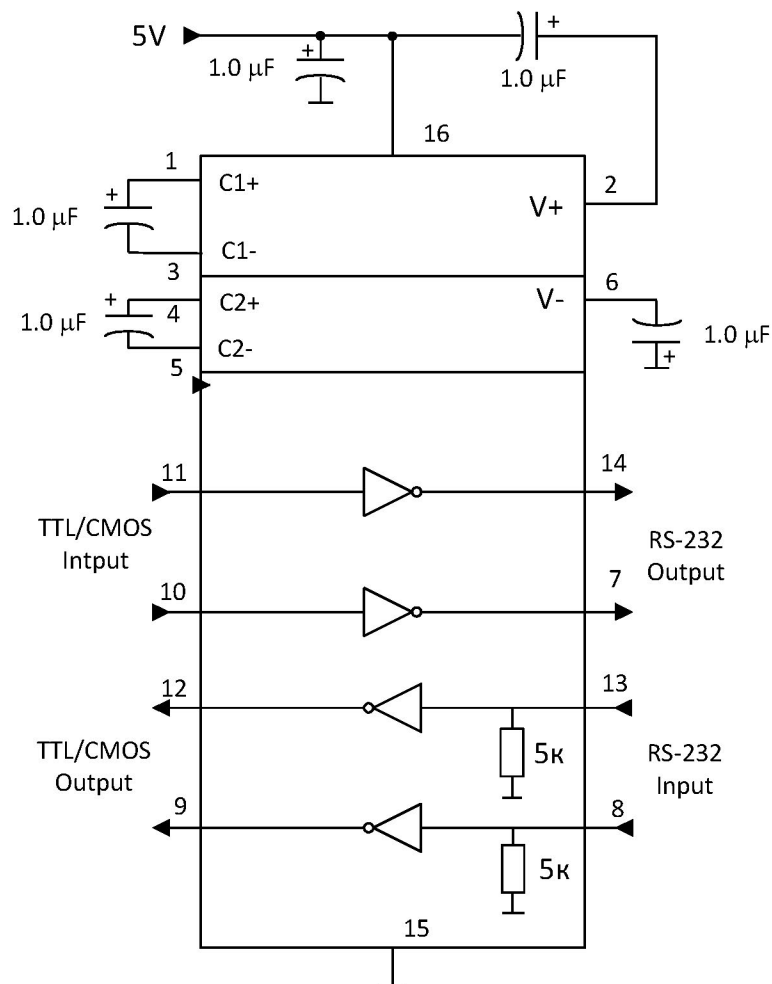
* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device.

These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied.

Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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	$^{\circ}C$



■ Static parameters

Symbol	Parameter	Test conditions	Rate				Unit
			25°C		-40 °C to 85 °C		
			min	max	min	max	
I_{CC}	Consumption current static	$V_{CC}=5.0\text{ V}$ $V_{IL}=0\text{ V}$	-	10.0	-	14.0*	mA
Receiver electrical parameters							
V_h	Hysteresis voltage	$V_{CC}=5.0\text{ V}$	0.2	0.9	0.2	1.0	V
V_{On}	On (operation) voltage	$V_O \leq 0.1\text{ V}$ $I_{OL} \leq 20\text{ uA}$	-	2.4	-	2.3	
V_{off}	Off (dropout) voltage	$V_O \geq V_{CC}-0.1\text{ V}$ $I_{OH} \leq -20\text{ uA}$	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
Transmitter electrical parameters							
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	uA
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/ μ s
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	$V_{CC}=4.5\text{ V}$ $C_L = 1000\text{ pF}$ $R_L = 3.0\text{ kOhm}$ $t_w = 7\text{ us}$ (for extreme $-t_w = 8\text{ us}$)	140	-	120	-	

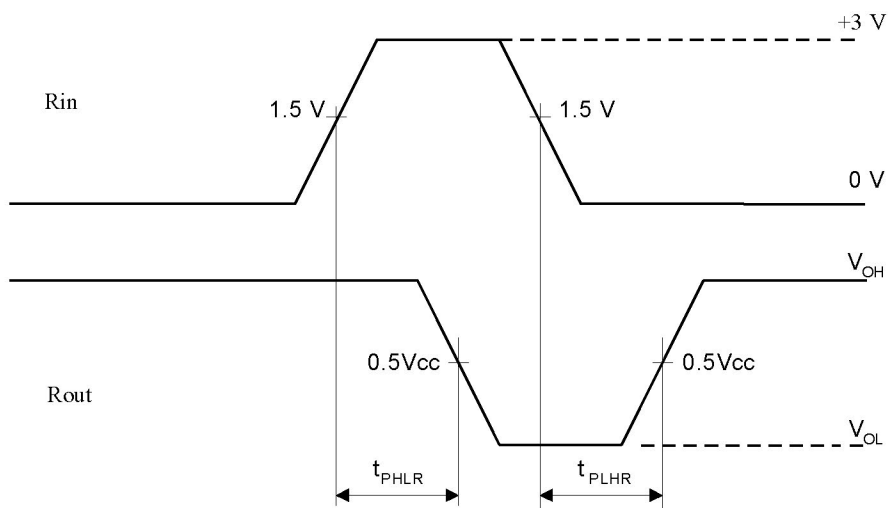
Dynamic parameters

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)	$V_{CC} = 4.5\text{ V}$ $C_L = 150\text{ pF}$ $V_{IL} = 0\text{ V}$ $V_{IH} = 3.0\text{ V}$ $t_{LH} = t_{HL} \leq 10\text{ ns}$	-	9.7	-	10	us
t_{PHLT} (t_{PLHT})	Signal propagation delay time when switching on (off)	$V_{CC} = 4.5\text{ V}$ $C_L = 2500\text{ pF}$ $V_{IL} = 0\text{ V}$ $V_{IH} = 3.0\text{ V}$ $R_L = 3\text{ kOhm}$ $t_{LH} = t_{HL} \leq 10\text{ ns}$		5.0*		6.0*	

Capacitance

Symbol	Parameter	V_{CC}	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

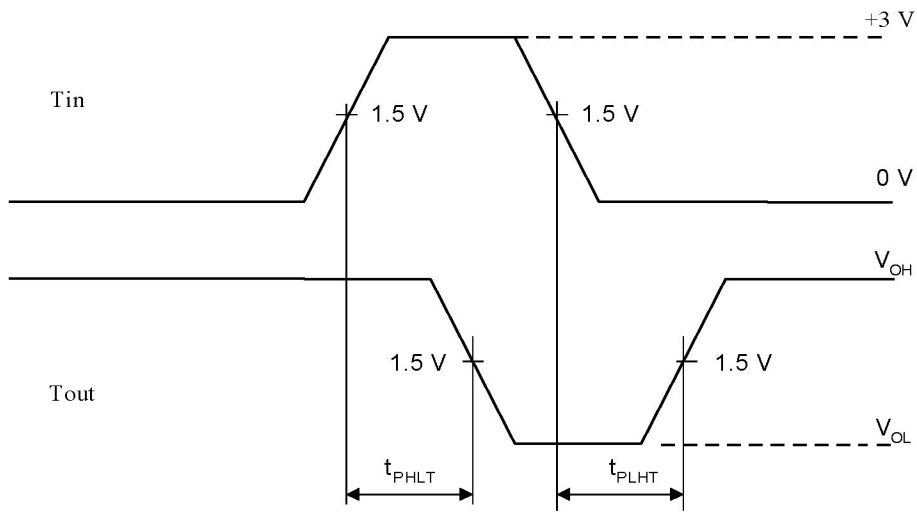


Figure 4

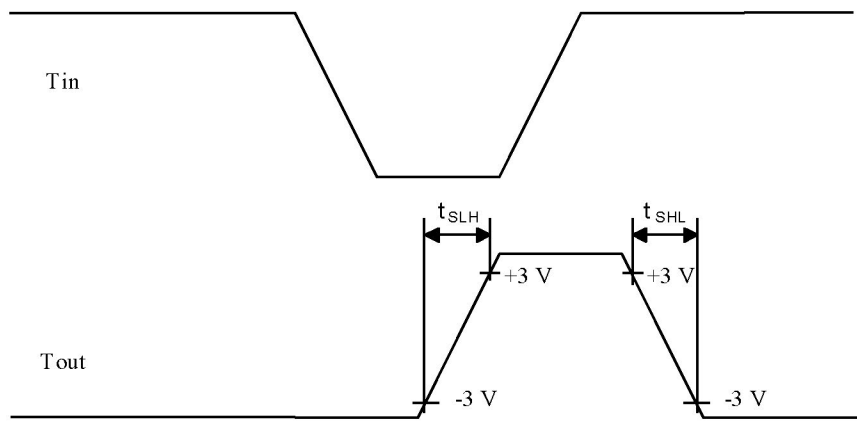


Figure 5

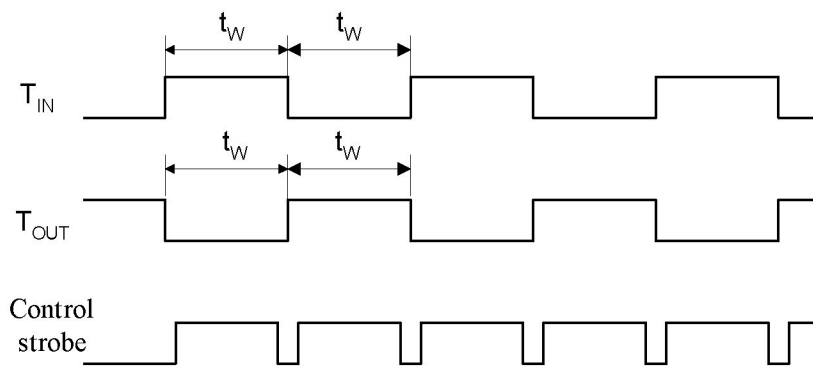
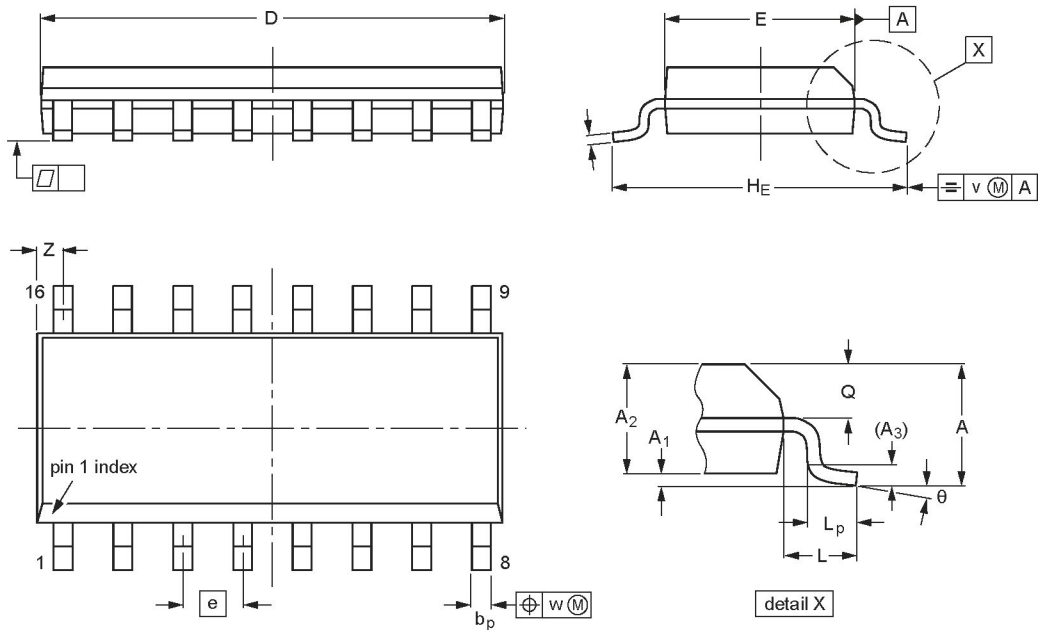
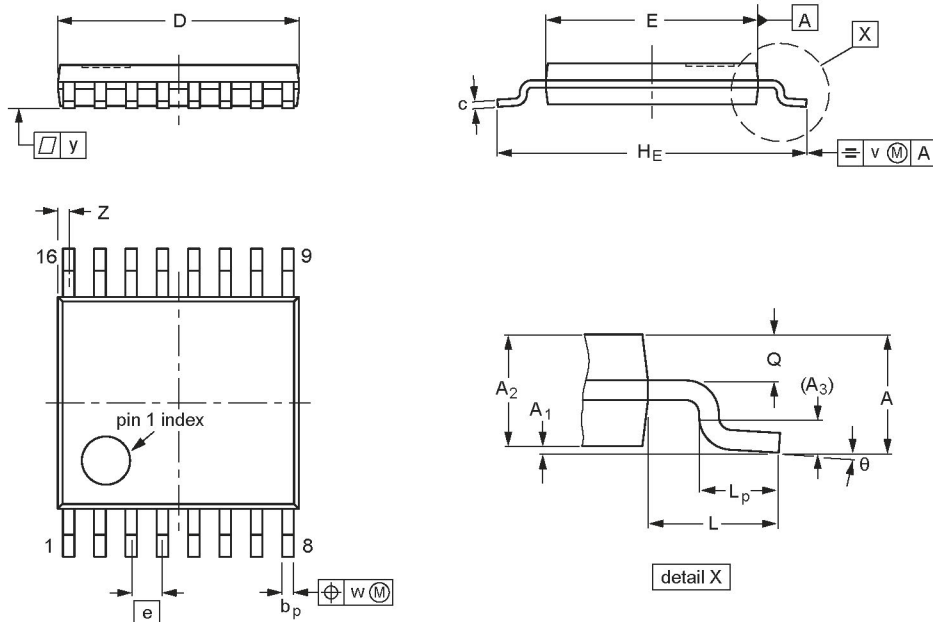


Figure 6

SOIC16: plastic small outline package; 16 leads; body width 3.9 mm

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽²⁾	e	H _E	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.40 0.06	8° 0°