ANALOG DEVICES

+5 V Powered
RS-232/RS-422 Transceiver

AD7306

FEATURES
RS-232 and RS-422 on One Chip
Single +5 V Supply
0.1 µF Capacitors
Short Circuit Protection
Excellent Noise Immunity
Low Power BiCMOS Technology
High Speed, Low Skew RS-422 Operation
–40°C to +85°C Operations

APPLICATIONS
DTE-DCE Interface
Packet Switching
Local Area Networks
Data Concentration
Data Multiplexers
Integrated Services Digital Network (ISDN)

GENERAL DESCRIPTION
The AD7306 line driver/receiver is a 5 V monolithic product which provides an interface between TTL signal levels and dual standard EIA RS-232/RS-422 signal levels. The part contains two RS-232 drivers, one RS-422 driver, one RS-232 receiver, and one receiver path which can be configured either as RS-232 or as RS-422.

An internal charge pump voltage converter facilitates operation from a single +5 V power supply. The internal charge pump generates ±10 V levels allowing RS-232 output levels to be developed without the need for external bipolar power supplies.

A highly efficient charge pump design allows operation using non polarized, miniature 0.1 µF capacitors. This gives a considerable saving in printed circuit board space over conventional products which can use up to 10 µF capacitors. The charge pump output voltages may also be used to power external circuitry which requires dual supplies.
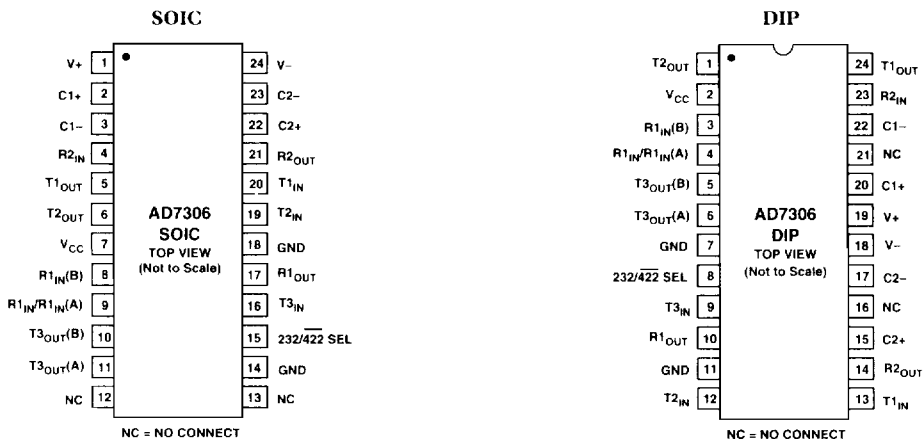
FUNCTIONAL BLOCK DIAGRAM
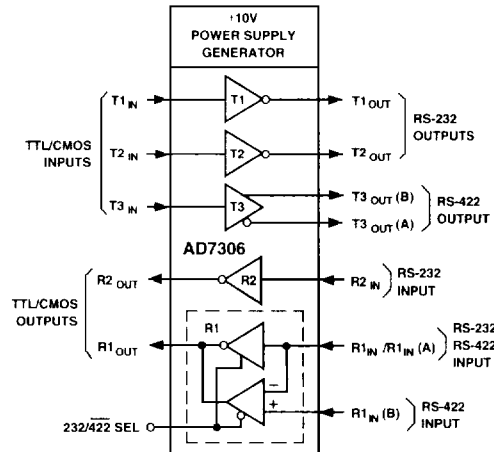
The RS-232 channels are suitable for communications rates up to 100 kHz and the RS-422 channels are suitable for high speed communications up to 5 MHz. The RS-422 transmitter complementary outputs are closely matched and feature low timing skew between the complementary outputs. This is often an essential requirement to meet tight system timing specifications.

All inputs feature ESD protection, all driver outputs feature high source and sink current capability and are internally protected against short circuits on the outputs. An epitaxial layer is used to guard against latch-up.

The part is available in a 24-lead SOIC and 24-pin plastic DIP package.

PIN CONFIGURATIONS

SOIC

V+ 1	24 V–
C1+ 2	23 C2–
C1– 3	22 C2+
R2$_{IN}$ 4	21 R2$_{OUT}$
T1$_{OUT}$ 5	20 T1$_{IN}$
T2$_{OUT}$ 6	19 T2$_{IN}$
V$_{CC}$ 7	18 GND
R1$_{IN}$(B) 8	17 R1$_{OUT}$
R1$_{IN}$/R1$_{IN}$(A) 9	16 T3$_{IN}$
T3$_{OUT}$(B) 10	15 232/$\overline{422}$ SEL
T3$_{OUT}$(A) 11	14 GND
NC 12	13 NC

AD7306 SOIC TOP VIEW (Not to Scale)

NC = NO CONNECT

DIP

T2$_{OUT}$ 1	24 T1$_{OUT}$
V$_{CC}$ 2	23 R2$_{IN}$
R1$_{IN}$(B) 3	22 C1–
R1$_{IN}$/R1$_{IN}$(A) 4	21 NC
T3$_{OUT}$(B) 5	20 C1+
T3$_{OUT}$(A) 6	19 V+
GND 7	18 V–
232/$\overline{422}$ SEL 8	17 C2–
T3$_{IN}$ 9	16 NC
R1$_{OUT}$ 10	15 C2+
GND 11	14 R2$_{OUT}$
T2$_{IN}$ 12	13 T1$_{IN}$

AD7306 DIP TOP VIEW (Not to Scale)

NC = NO CONNECT

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
RS-232 DRIVER					
TTL Input Logic Low, V_{INL}			0.8	V	
TTL Input Logic High, V_{INH}	2.0			V	
Input Logic Current		0.1	±10	μA	V_{IN} = 0 V to V_{CC}
RS-232 High Level Output Voltage	5.0	7.3		V	R_L = 3 kΩ
RS-232 Low Level Output Voltage	-5.0	-6.5		V	R_L = 3 kΩ
Output Short Circuit Current	±5	±12		mA	V_{OUT} = 0 V, T_A = 0°C to +70°C
Slew Rate	8	20	30	V/μs	C_L = 50 pF, R_L = 3 kΩ
		4		V/μs	C_L = 2500 pF, R_L = 3 kΩ
Output Resistance (Powered Down)	300	10M		Ω	V_{CC} = 0 V, V_{OUT} = ±3 V
RS-232 RECEIVER					
Input Voltage Range	-15		+15	V	
RS-232 Input Threshold Low	0.8	1.3		V	
RS-232 Input Threshold High		1.7	2.4	V	
RS-232 Input Hysteresis	0.1	0.4	1.0	V	
RS-232 Input Resistance	3	5	7	kΩ	
TTL Output Voltage Low, V_{OL}		0.2	0.4	V	I_{OUT} = +4 mA
TTL Output Voltage High, V_{OH}	3.5	4.8		V	I_{OUT} = -4 mA
RS-422 DRIVER					
TTL Input Logic Low, V_{INL}			0.8	V	
TTL Input Logic High, V_{INH}	2.0			V	
Logic Input Current		0.1	±10	μA	V_{IN} = 0 V to V_{CC}
Differential Output Voltage			5.0	V	V_{CC} = 5 V, R_L Diff = ∞; Figure 3
	2			V	R_L Diff = 100 Ω; Figure 3
Common-Mode Output Voltage			3	V	
Δ|V_{OUT}| for Complementary O/P States			0.2	V	R_L Diff = 100 Ω
Output Short Circuit Current	35		150	mA	0 V ≤ V_{CMR} ≤ +7 V
RS-422 RECEIVER					
Common-Mode Voltage Range			±7	V	Typical RS-422 Input Voltage <5 V
Differential Input Threshold Voltage	-0.2		+0.2	V	
Input Voltage Hysteresis		70		mV	V_{CM} = 0 V
Input Resistance	3	5	7	kΩ	
TTL Output Voltage Low, V_{OL}		0.2	0.4	V	I_{OUT} = +4.0 mA
TTL Output Voltage High, V_{OH}	3.5	4.8		V	I_{OUT} = -4.0 mA
232/$\overline{422}$ SEL Input					
Input Logic Low, V_{INL}			0.8	V	
Input Logic High, V_{INH}	2.0			V	
Logic Input Current		0.1	±10	μA	V_{IN} = 0 V to V_{CC}
POWER SUPPLY CURRENT					
I_{CC}		10	15	mA	Outputs Unloaded
CHARGE PUMP VOLTAGE GENERATOR					
V+ Output Voltage		9		V	RS-232 Output Unloaded; See Typical Performance Curves
V- Output Voltage		-9		V	RS-232 Outputs Unloaded; See Typical Performance Curves
Generator Rise Time		200		μs	

Specifications subject to change without notice.

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option*
AD7306JR	0°C to +70°C	24-Lead SOIC	R-24
AD7306JN	0°C to +70°C	24-Pin DIP	N-24
AD7306AR	-40°C to +85°C	24-Lead SOIC	R-24
AD7306AN	-40°C to +85°C	24-Pin DIP	N-24

*For outline information see Package Information section.