

钍地半导体
Tudi Semiconductor

Product Specification

TUDI-ADM202JRNZ/ADM202JNZ

High Speed, 5 V, 0.1 µF CMOS RS-232 Driver/Receiver

网址 www.sztdbdt.com

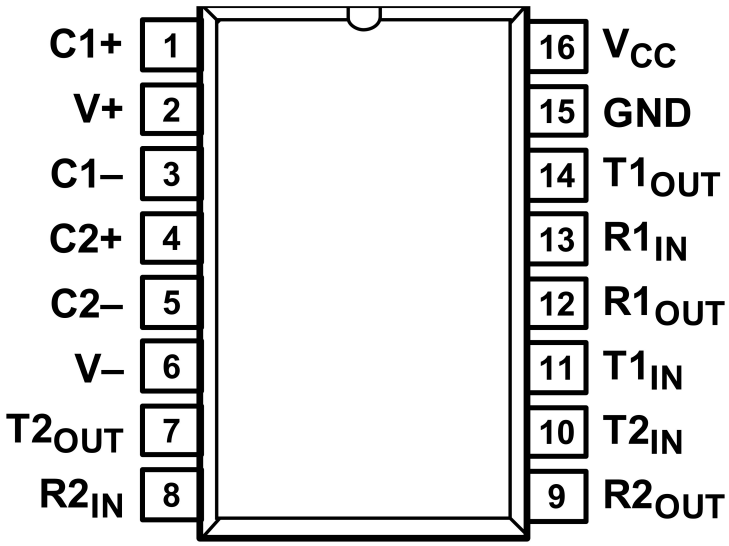
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semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

- 120 kB transmission rate
- Small (0.1 µF) charge pump capacitors
- Single 5 V power supply
- Meets TIA/EIA-232-E and V.28 specifications
- 2 drivers and 2 receivers
- On-board dc-to-dc converters
- ±9 V output swing with 5 V supply
- Low power BiCMOS: 2.5 mA I_{CC}
- ±30 V receiver input levels



SOP16/DIP16

APPLICATIONS

- Computers
- Peripherals
- Modems
- Printers
- Instruments

DESCRIPTION

The ADM202 is a 2-channel RS-232 line driver/receiver pair designed to operate from a single 5 V power supply. A highly efficient on-chip charge pump design permits RS-232 levels to be developed using charge pump capacitors as small as 0.1 µF. This converter generates ±10 V RS-232 output levels.

The ADM202 meets or exceeds the TIA/EIA-232-E and V.28 specifications. Fast driver slew rates permit 120 kB operation, and high drive currents allow extended cable lengths.

An epitaxial BiCMOS construction minimizes power consump-tion to 10 mW and guards against latch-up. Overvoltage protection is provided, allowing the receiver inputs to withstand continuous voltages in excess of ±30 V. In addition, all pins contain ESD protection to levels greater than 2 kV.

The ADM202 is available in a 16-lead PDIP and both narrow and wide 16-lead SOIC packages.

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Rating
V_{CC}	6V
V+	(V_{CC}-0.3V)to+14V
V-	+0.3 V to-14V
Input Voltages	
$T1_{IN}$,$T2_{IN}$	-0.3Vto(V_{CC}+0.3V)
R_{IN},$R2_{IN}$	±30V
Output Voltages	
$T1_{OUT}$,$T2_{OUT}$	((V+)+0.3V)to((V-)-0.3 V)
$R1_{OUT}$,$R2_{OUT}$	-0.3Vto(V_{CC}+0.3V)
Short-Circuit Duration	
$T1_{OUT}$,$T2_{OUT}$	Continuous
Power Dissipation	
16-Lead PDIP(N-16)	470 mW
16-Lead SOIC(R-16)	600 mW
Thermal Impedance,θJA	
16-Lead PDIP(N-16)	135℃/W
16-Lead SOIC(R-16)	105℃/W
Operating Temperature Range	
Commercial(JVersion)	0℃ to 70℃
Storage Temperature Range	-65℃to +150℃
Lead Temperature Soldering	
Vapor Phase(60 sec)	215℃
Infrared (15 sec)	220℃
ESD Rating	>2000V

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

Table 2. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	C1+	External Positive Capacitor1 Connection.The positive terminal is connected to this pin.
2	V+	Internally Generated Positive Supply(+10V nominal).
3	C1-	External Negative Capacitor 1 Connection.The negative terminal is connected to this pin.
4	C2+	External Positive Capacitor2 Connection.The positive terminal is connected to this pin.
5	C2-	External Negative Capacitor 1 Connection.The negative terminal is connected to this pin.
6	V-	Internally Generated Negative Supply(-10V Nominal).
714	$T2_{OUT}$, $T1_{OUT}$	Transmitter(Driver)Outputs.These outputs are RS-232 levels (typically±10V).
813	$R2_{IN}$, $R1_{IN}$	Receiver Inputs.These inputs accept RS-232 signal levels.An internal 5 k pull-down resistor to GND is connected on each of these inputs.
912	$R2_{OUT}$ $R1_{OUT}$	Receiver Outputs.These outputs are TTL/CMOS levels.
1,011	$T2_{IN}$,$T1_{IN}$	Transmitter(Driver)Inputs.These inputs accept TTL/CMOS levels.An internal 400 kΩ pull-up resistorto V_{cc} isconnected on each input.
15	GND	Ground.This pin must be connected to 0V.
16	V_{CC}	Power Supply Input,5V±10%.

SPECIFICATIONS

V_{CC} = 5 V ± 10%, (C1 to C4 = 0.1 µF). All specifications T_{MIN} to T_{MAX}, unless otherwise noted

Table 3.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
OUTPUT VOLTAGE SWING	±5	±9		V	Vcc=5V±5%;T1OUT and T2OUT loaded with 3 kΩ to GND
	±5	±9		V	Vcc=5V±10%;TA=25℃;T1OUT and T2OUT loaded with 3 kΩ to GND
Vcc POWER SUPPLY CURRENT (Icc)		2.5	6.0	mA	No load;T1IN and T2IN=Vcc or T1IN and T2IN=GND
INPUT LOGIC THRESHOLD					
Low,V_{INL}			0.8	V	TXIN
High,V_{INH}	2.4			V	TXIN
LOGIC PULL-UP CURRENT		12	25	µA	TXIN=0V
RS-232 INPUT					
Voltage Range	-30		+30	V	
Threshold					
Low	0.8	1.2		V	
High		1.6	2.4	V	
Hysteresis	0.2	0.4	1.0	V	
Resistance	3	5	7	kΩ	TA=0℃ to 85℃
TTL/CMOS Output Voltage					
Low,V_{OL}			0.4	V	IOUT=1.6mA
High,V_{OH}	3.5			V	IOUT=-1.0 mA
PROPAGATION DELAY		0.3	5	µs	RS-232 to TTL
TRANSITION REGION SLEW RATE		8		V/µs	RL=3kΩ,CL=1000 pF,measured from +3V to-3V or -3V to+3V
BAUD RATE	120			kB	RL=3kΩ,CL=1nF
OUTPUT					
Output Resistance	300			Ω	Vcc=V+=V-=0V,VOUT=±2V
RS-232 Output Short-Circuit Current		±10	± 60	mA	

THEORY OF OPERATION

The ADM202 is an RS-232 driver/receiver designed to solve interface problems by meeting the TIA/EIA-232E specifications while using a single digital 5 V supply. The EIA standard requires that transmitters deliver ±5 V minimum on the transmission channel and that receivers can accept signal levels down to ±3 V. The device achieves this by integrating step-up voltage converters and level shifting transmitters and receiverson the same chip. CMOS technology keeps the power dissipation to an absolute minimum.
The ADM202 contains an internal voltage doubler and a voltage inverter that generates ±10 V from the 5 V input. External 0.1 µF capacitors are required for the internal voltage converter.

APPLICATIONS INFORMATION

The internal circuitry consists of three main sections, as follows:
- A charge pump dc-to-dc voltage converter
- TTL/CMOS to RS-232 transmitters
- RS-232 to TTL/CMOS receivers

CHARGE PUMP DC-TO-DC VOLTAGE CONVERTER

The charge pump voltage converter consists of an oscillator and a switching matrix. The converter generates a ±10 V supply from the input 5 V level in two stages, using a switched capacitor technique as illustrated in Figure 9 and Figure 10. First, the 5 V input supply is doubled to 10 V using Capacitor C1 as the charge storage element. The 10 V level is then inverted to generate 10 V using C2 as the storage element.
Capacitors C3 and C4 reduce the output ripple. Their values are not critical and can be reduced if higher levels of ripple are acceptable. The charge pump capacitors, C1 and C2, can also be reduced at the expense of higher output impedance on the V+ and V supplies.
The V+ and V supplies can be used to power external circuitry if the current requirements are small.

TTL/CMOS TO RS-232 TRANSMITTERS (DRIVERS)

The drivers convert TTL/CMOS input levels into TIA/EIA-232-E output levels. With V_{CC} = 5 V and driving a typical TIA/EIA-232-E load, the output voltage swing is ±9 V. Even under worst case conditions, the drivers are guaranteed to meet the ±5 V TIA/EIA- 232-E minimum requirement.
The input threshold levels are both TTL and CMOS compatible with the switching threshold set at $V_{CC}/4$. With a nominal V_{CC} = 5 V, the switching threshold is 1.25 V typical. Unused inputs can be left unconnected, as an internal 400 k pull-up resistor pulls them high, forcing the outputs into a low state.

As required by the TIA/EIA-232-E standard, the slew rate is limited to less than 30 V/µs without the need for an external slew limiting capacitor, and the output impedance in the power down state is greater than 300 .

RS-232 TO TTL/CMOS RECEIVERS

The receivers are inverting level shifters that accept TIA/EIA-232-E input levels (±5 V to ±15 V) and translate them into 5 V TTL/ CMOS levels. The inputs have internal 5 k pull-down resistors to ground and are protected against overvoltages of up to ±30 V. The guaranteed switching thresholds are 0.8 V (V_{INL}) and 2.4 V (V_{INH}), which are well within the ±3 V TIA/EIA-232-E require ment. The low level threshold is deliberately positive because it ensures that an unconnected input is interpreted as a low level.
The receivers have a Schmitt triggered input with a hysteresis level of 0.5 V. This hysteresis level ensures error free reception, both for noisy inputs and for inputs with slow transition times.

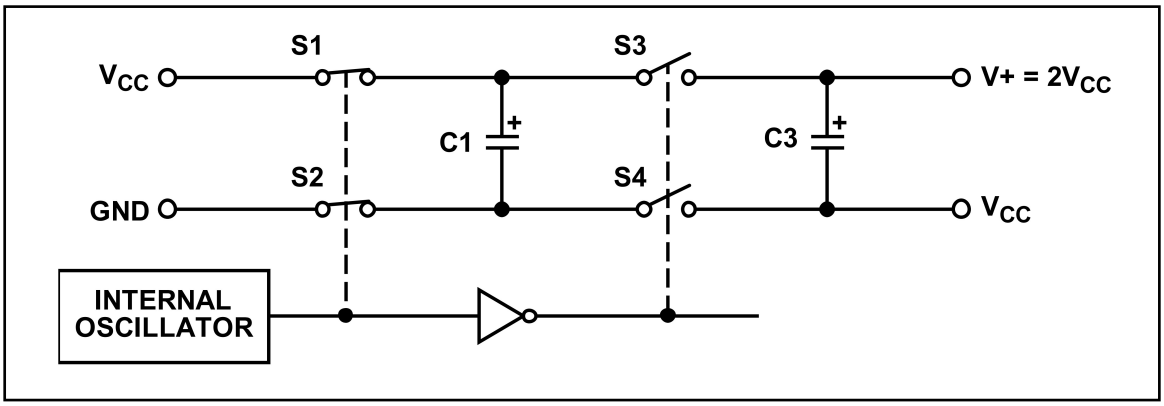


Figure 1. Charge Pump Voltage Doubler

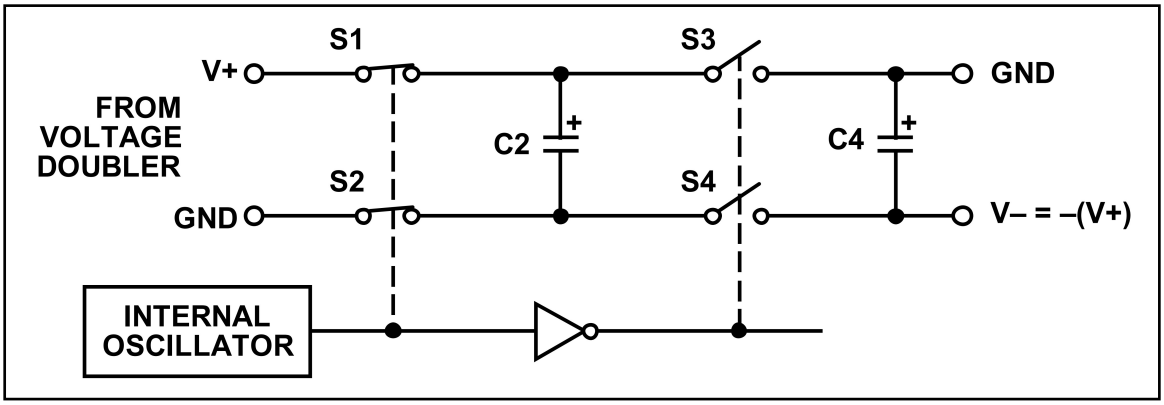


Figure 2. Charge Pump Voltage Inverter

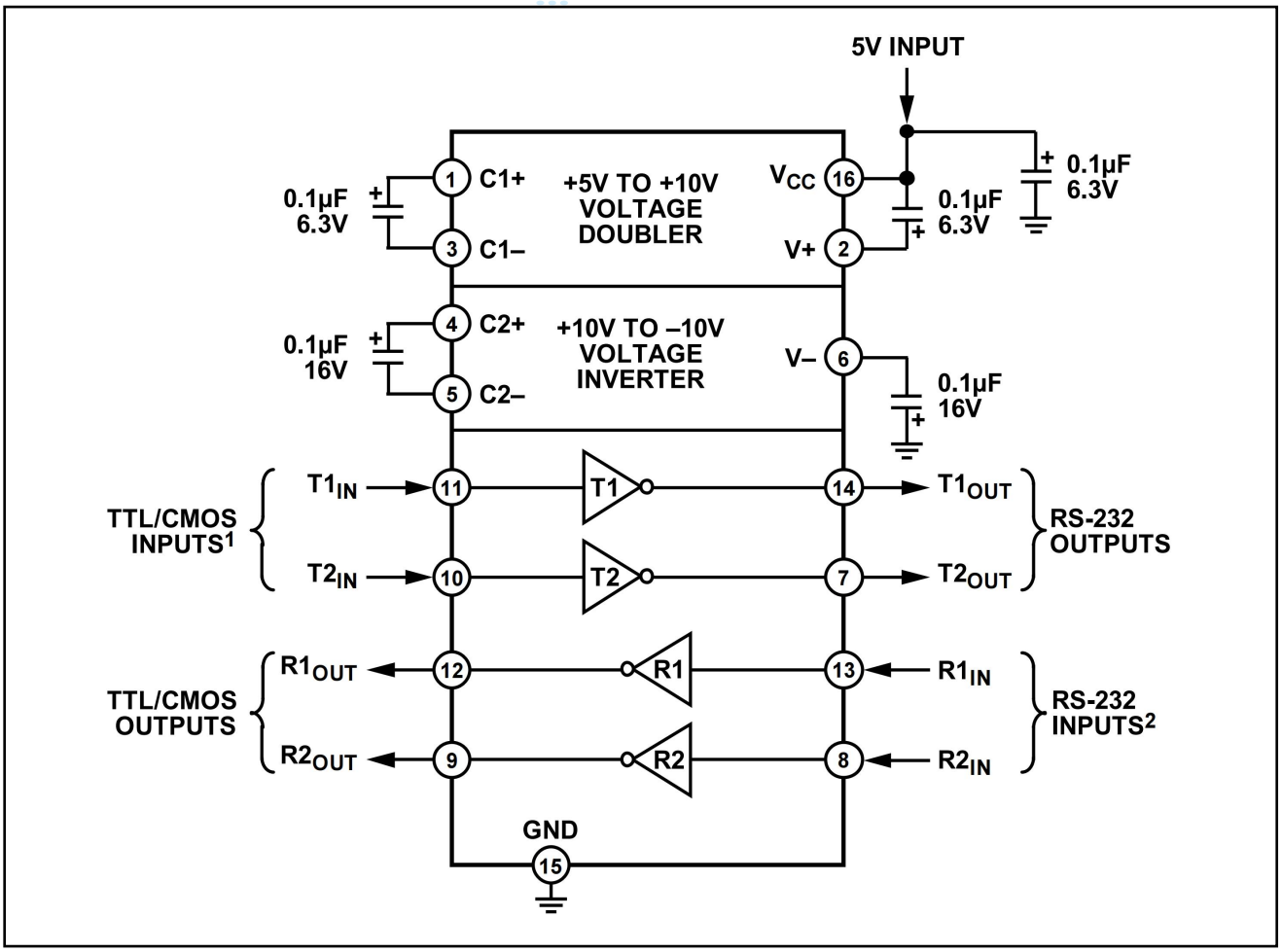


Figure 3.TYPICAL APPLICATION CIRCUIT

NOTE:(1)INTERNAL 400kΩ PULL-UP RESISTOR ON EACH TTL/CMOS INPUT.
(2)INTERNAL 5kΩ PULL-DOWN RESISTOR ON EACH RS-232 INPUT.

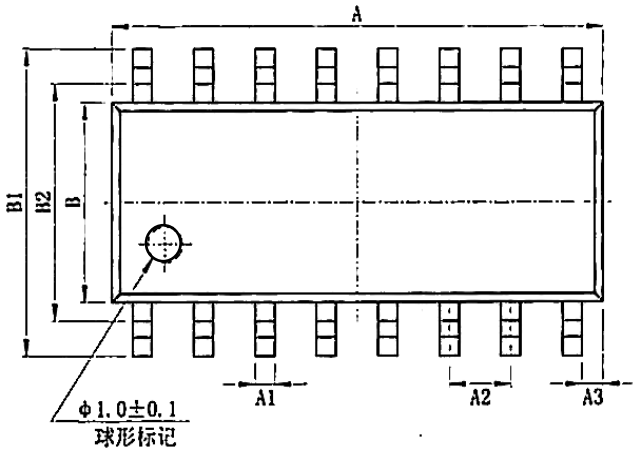
Order information

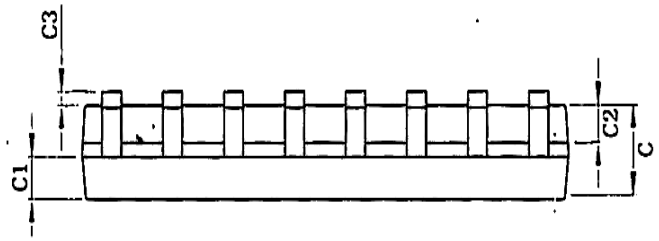
Order Number	Package	Package Quantity	Marking On The park	Temperature
ADM202JRNZ-REEL-TUDI	SOP16	Tape,Reel,4000	ADM202J	0°C to 70°C
ADM202JNZ-TUDI	DIP16	Tube,25,A box of 1000	ADM202JNZ	

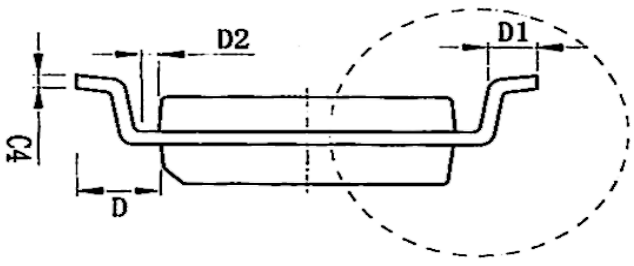
Revision history

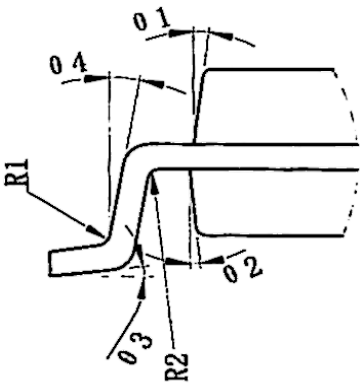
	Date	Revision	Page
V1.0	2023/3	New	1-8
V1.1	2026/2	Update model and PDF template	1-12

Package SOP16



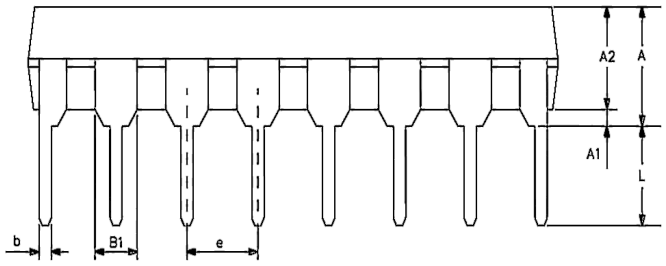


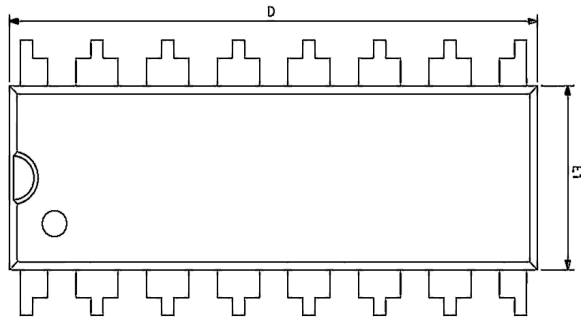


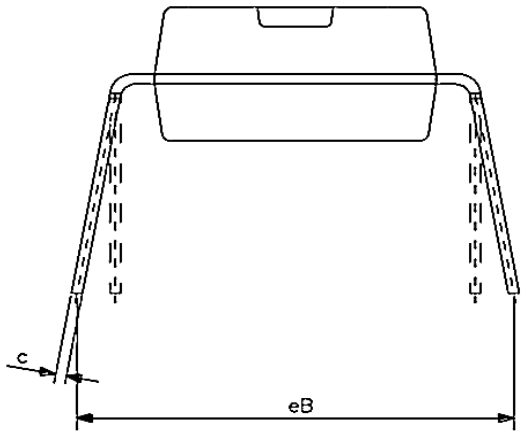


SIZE / SYMBOL	MIN./mm	MAX./mm
A	9.80	10.00
A1	0.356	0.456
A2	1.27TYP	
A3	0.302TYP	
B	3.85	3.95
B1	5.84	6.24
B2	5.00 TYP	
C	1.40	1.60
C1	0.61	0.71
C2	0.54	0.64
C3	0.05	0.25
C4	0.203	0.233
D	1.05 TYP	
D1	0.40	0.70
D2	0.15	0.25
R1	0.20TYP	
R2	0.20TYP	
01	8°~12°TYP4	
02	8°~12°TYP4	
03	0°~8°	
04	4°~12°	

Package DIP16







SIZE / SYMBOL	MIN./mm	MAX./mm
A2	3.20	3.60
A1	0.51	___
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
θ1	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°

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