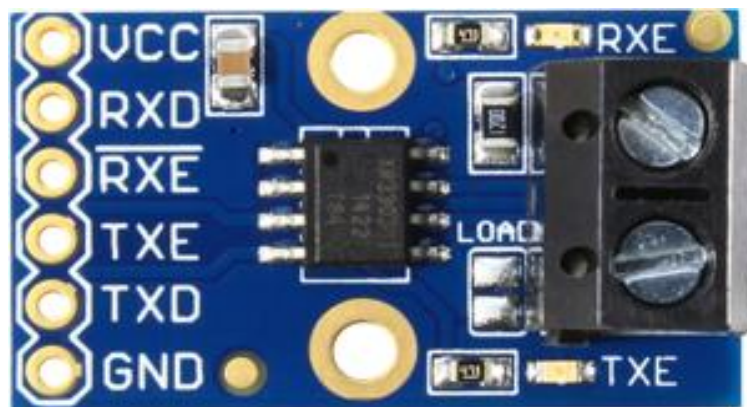


ARTEKIT LABS

AK-RS485/422-HD

Reference manual





Contents

About this document	3
Revision history	3
Contact information.....	3
Life support policy.....	3
Copyright information.....	3
Specifications	3
General description.....	3
Environmental requirements.....	4
Handling the board	4
Board overview.....	4
Pin description.....	4
Board dimensions in millimeters (inches).....	4
Electrical characteristics	5
Test conditions	5
Minimum and maximum values	5
Typical values.....	5
Absolute maximum ratings	5
Normal operating parameters.....	5
Board usage	6
MCU connection modes	6
Load resistor.....	7
LED indicators	8
Connecting several boards in a RS-485/422 network	8
Connecting two AK-RS485/422-HD boards to get a Full Duplex link:	9
Testing the board	9
Connecting the AK-RS485/422-HD with the Arduino Uno board.....	10



About this document

Revision history

The table below displays the revision history for the chapters in this manual.

Chapter	Date	Revision	Changes made
All	March, 2016	1.0	First publication

Contact information

For the latest news, upgrades and information about Artekit products, visit the Artekit web site at <http://www.artekit.eu>

For technical support on this product, visit the support page at <http://www.artekit.eu/contact>

For additional information about Artekit products, consult the sources below.

Information type	Resource
Technical support	support@artekit.eu
Literature	www.artekit.eu
Sales	sales@artekit.eu
Products forum	www.artekit.eu

Life support policy

Artekit Italy products are not indented or authorized for use as critical components in life support devices or systems without the express written approval from Artekit Italy. Those devices may include devices for supporting or sustaining life, devices for surgical implant into the body or any other device whose failure to perform correctly could result in life support failure.

Copyright information

This document is copyright © 2011 Artekit Italy. All rights reserved. Any person may view, copy, print and distribute this document or any portion of this document for informational purposes only as long as the copyright notice remains included.

Specifications

General description

The AK-RS485/422-HD is a RS485/RS422 driver that enables a single UART to send and receive data over an EIA 485/422 network in half-duplex mode. This board can be powered from 2.8V to 5.5V consuming only 0.3mA in idle mode, and allowing up to 256 units on bus.

The Artekit AK-RS485/422 board features an Exar XR33038ID-F device, supporting up to 10Mb speed.

Environmental requirements

The AK-RS485/422-HD board must be stored between -65°C to +150°C. The recommended operating temperature is between -40°C and +85°C.

The AK-RS485/422-HD board can be damaged without proper anti-static handling.

Handling the board

When handling the board, it is important to observe the following precaution:

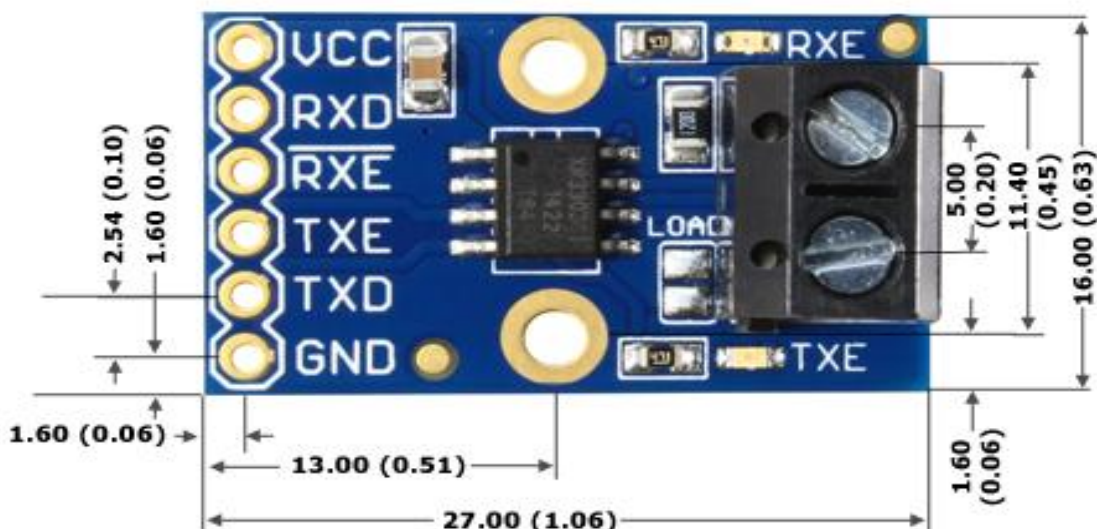
Static discharge precaution – Without proper anti-static handling the board can be damaged. Therefore, take anti-static precautions while handling the board.

Board overview

Pin description

VCC	Power Supply (2.8V to 5.5V)
RXD	Data output, connect to MCU RXD pin
RXE	Input, 0=Enable data reception, 1=Disable data reception
TXE	Input, 1=Enable data transmission, 0=Disable data transmission
TXD	Data input, connect to the MCU TXD pin
GND	Power supply ground
A	Input/Output, Negative signal A – Green cable
B	Input/Output, Positive signal B – Red cable

Board dimensions in millimeters (inches)





Please read carefully the Exar XR33038ID-F datasheet. You can load the datasheet from our website <http://www.artekit.eu> or from the Exar website <https://www.exar.com>

Electrical characteristics

Test conditions

Unless otherwise specified, all voltages are referenced to GND.

Minimum and maximum values

Unless otherwise specified, the minimum and the maximum values are guaranteed in the worst conditions of ambient temperature, supply voltage and frequencies by tests in production on 100% of the devices with an ambient temperature $T_A = 25^{\circ}\text{C}$.

Typical values

Unless otherwise specified, typical data are based on $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5\text{V}$.

Absolute maximum ratings

SYMBOL	RATINGS	MIN	MAX	UNIT
VCC	External main supply voltage respect to GND	-0.3V	+7	V

WARNING Exceeding values beyond these absolute maximum values may cause permanent damage to the device. Operating at absolute maximum rating conditions for extended periods may affect the device reliability.

Normal operating parameters

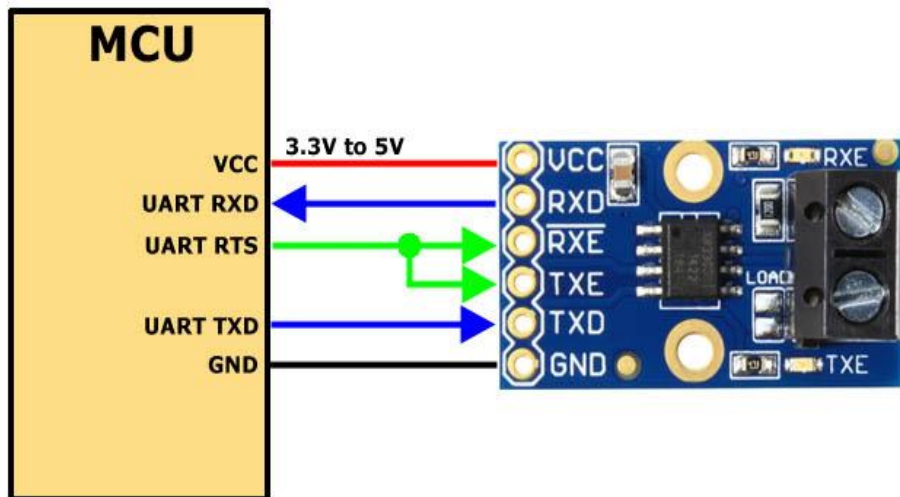
SYMBOL	PARAMETER	VALUE	UNIT
VCC	Power supply applied to VCC pin	2.8V to 5.5V	V

Board usage

MCU connection modes

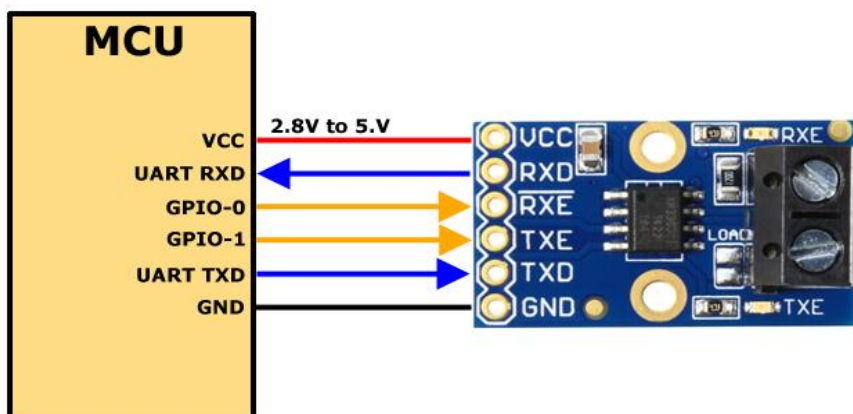
Mode 1: RTS manages the data flow

When the UART RTS is in passive mode (logical 1) the reception is disabled and the transmission is enabled. When the UART RTS is in active mode (logical 0) the reception is enabled and the transmission is disabled.



Mode 2: The MCU has the full flow control

GPIO-0 control the RXD data flow and the GPIO-1 control the TXD data flow.



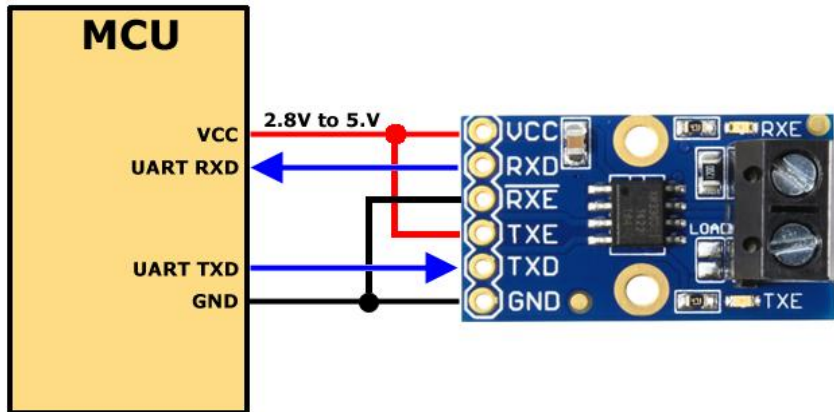
Flow control table

RXE	TXE	Transmit	Receive
0	0	No	Yes
0	1	Yes	Yes
1	0	High Z	
1	1	Yes	No



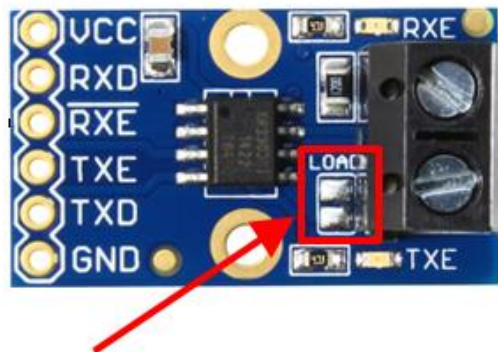
Mode 3: No flow control. TXD and RXD always active.

Use this mode to enable the echo of the transmitted characters. Each character transmitted is sent to the network but it is also transmitted back to the MCU. Ideal to check the network/board wiring and integrity.

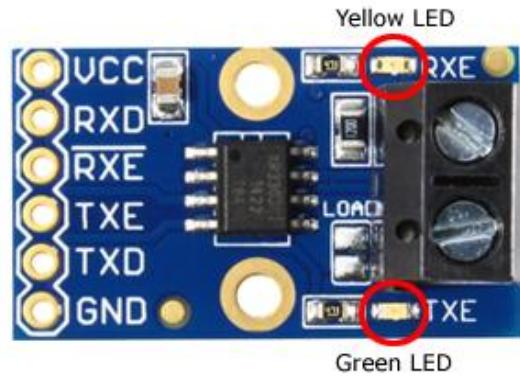


Load resistor

The AK-RS485/422-HD board has a solder jumper to enable an on-board 120 Ohm load resistor in parallel with the network cables. Drop some solder to create a short circuit between the LOAD pads. This option must be implemented only on the first and the last boards in the network.

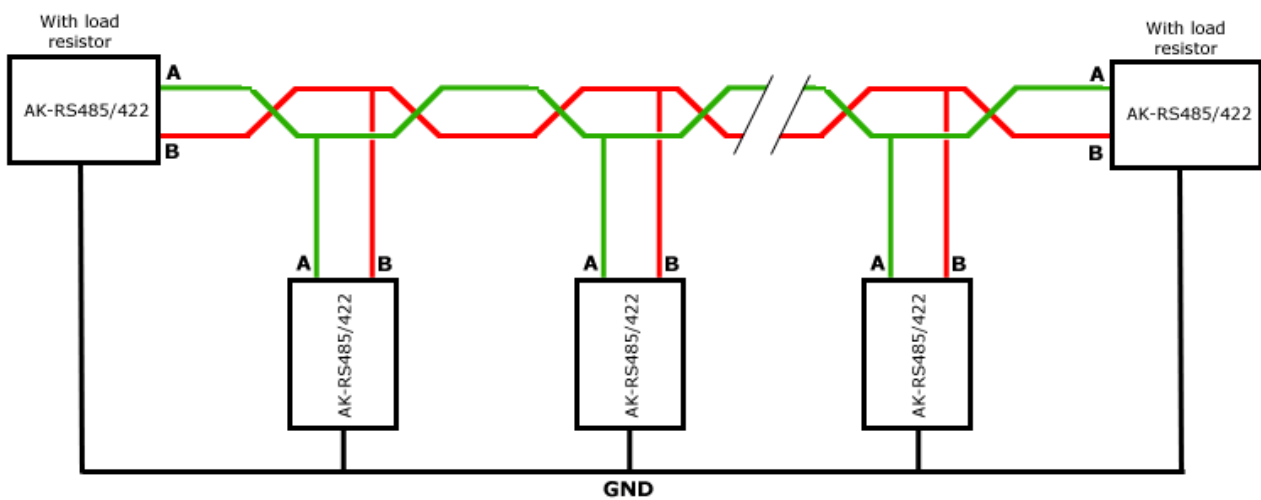


LED indicators



Yellow LED, when ON indicates that the reception is enabled. Green LED, when ON indicates that the transmission is enabled.

Connecting several boards in a RS-485/422 network

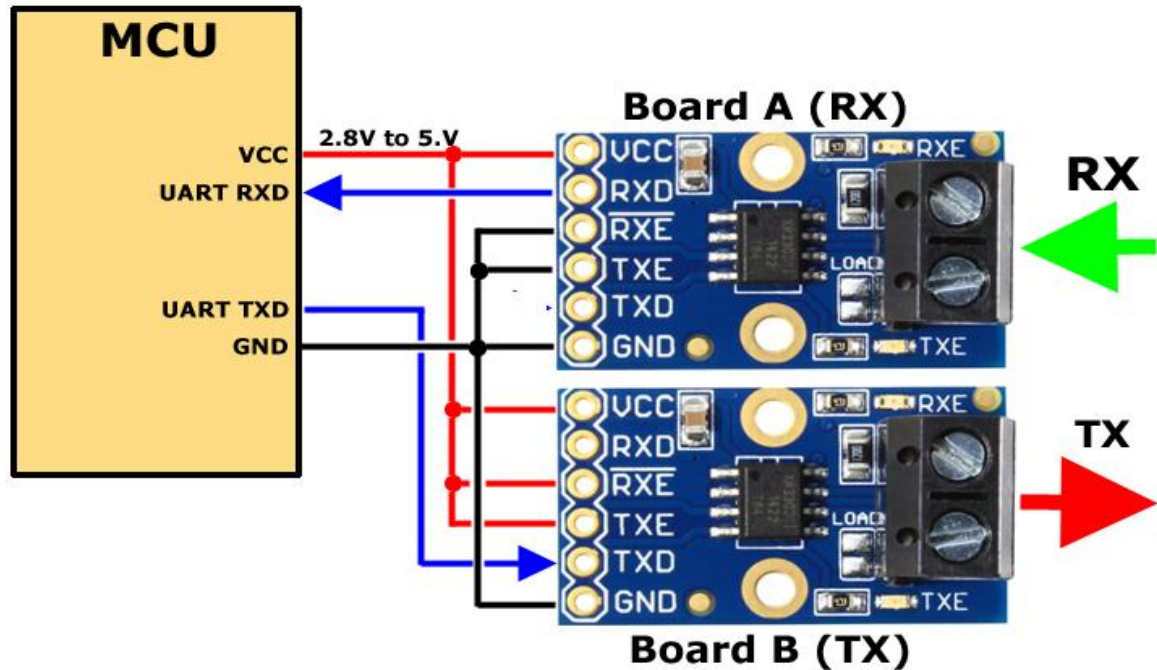




Connecting two AK-RS485/422-HD boards to get a Full Duplex link:

Two AK-RS485/422 boards can be connected to obtain a full duplex link. The board A is the receiving part and has the nRXE connected to ground, activating the reception, and TXE connected to ground disabling the transmission.

In the board B the nRXE is connected to VCC to disable the reception, and TXE is also connected to VCC to activate the transmission.



Testing the board

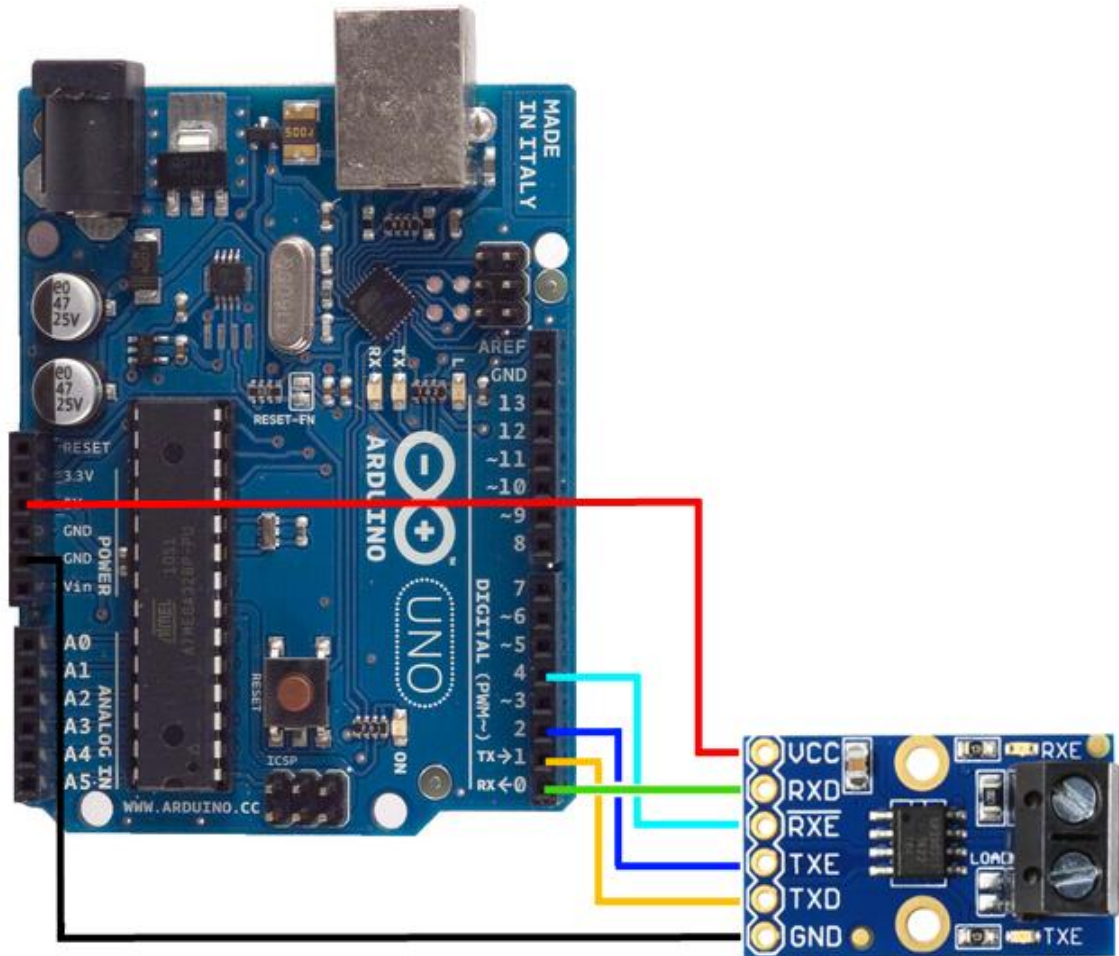
To test the board follow the next steps:

- 1) Disconnect the board from the RS485/422 network.
- 2) Connect the board to the MCU as in **Mode 3: No flow control** example.
- 3) Send a character through MCU UART.
- 4) Check if the transmitted character is read back by the MCU UART.

If the transmitted character is read back, the board is OK

Connecting the AK-RS485/422-HD with the Arduino Uno board

The following example shows the connections between an Arduino UNO board and the AK-RS485/422/HD board.



AK-RS485/422-HD PIN NAME	Arduino Uno PIN NAME	DETAILS
VCC	5V	5V
GND	GND	Ground
TXD	TX->	UART TXD
RXD	RX<-	UART RXD
nRXE	4	RXD Flow Control
TXE	2	TXD Flow Control