



RS485 Bridge

**BMB22M301**

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## Table of Contents

<b>Features</b> .....	<b>3</b>
<b>General Description</b> .....	<b>3</b>
<b>Applications</b> .....	<b>3</b>
<b>Block Diagram</b> .....	<b>3</b>
<b>Pin Assignment</b> .....	<b>4</b>
<b>Pin Description</b> .....	<b>4</b>
<b>Technical Specifications</b> .....	<b>4</b>
Absolute Maximum Ratings .....	4
Recommended Operating Conditions .....	4
D.C. Electrical Characteristics.....	5
A.C. Electrical Characteristics.....	5
<b>Functional Description</b> .....	<b>5</b>
System Description .....	5
Operating Principles.....	5
Jumper .....	6
<b>Application Circuits</b> .....	<b>6</b>
<b>Dimensions</b> .....	<b>6</b>
<b>Reference Information</b> .....	<b>7</b>
Revision History .....	7
Buy Online.....	7

## Features

- Operating voltage range: 3.0V~5.5V
- TX operating current: 36.5mA @ 5V (UART baud rate: 9600bps)
- RX operating current: 2.5mA
- Maximum data rate: 1000kbps
- Operating temperature range: -40°C~85°C
- Bridge size: 40mm×26mm×10.4mm



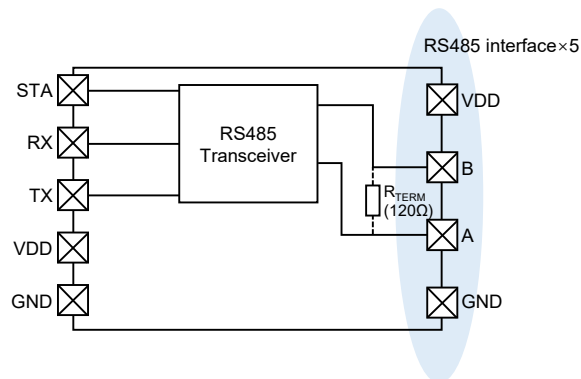
## General Description

The BMB22M301 is a UART to RS485 Bridge that supports the half-duplex data transmission, it can implement the bidirectional conversion between UART signals and RS485 differential signals. With the characteristics of long distance and affordable, the theoretical maximum transmission distance of the RS485 can be 1200 meters. The maximum data rate of the BMB22M301 is 1000kbps. Up to 256 RS485 devices can be mounted simultaneously on the same bus. The RS485 communication protocol is widely used in communication, industrial automation, access control systems and other areas to implement remote control and monitoring of equipment.

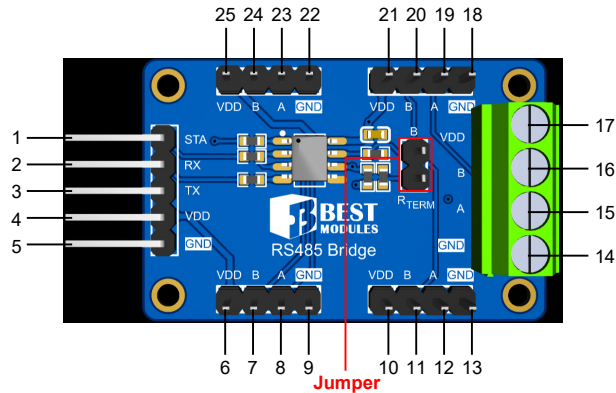
## Applications

- Industrial control
- Security system
- Instrumentation

## Block Diagram



## Pin Assignment



## Pin Description

Pin	Function	Type	Description
1	STA	I	RS485 transceiver state pin
2	RX	I	RS485 transceiver input
3	TX	O	RS485 transceiver output
4	VDD	PWR	Positive power supply
5	GND	PWR	Negative power supply
6, 10, 17, 21, 25	VDD	PWR	Positive power supply
7, 11, 16, 20, 24	B	I/O	RS485 signal line B
8, 12, 15, 19, 23	A	I/O	RS485 signal line A
9, 13, 14, 18, 22	GND	PWR	Negative power supply

Legend: PWR: Power;

I/O: Digital input/output.

## Technical Specifications

### Absolute Maximum Ratings

Parameter	Value
Power Supply Voltage (VDD)	$V_{GND}-0.3V \sim V_{GND}+7.0V$
RS485 Transceiver State Pin Voltage (STA)	$V_{GND}-0.3V \sim V_{DD}+0.3V$
RS485 Transceiver Input/Output Voltage (RX, TX)	$V_{GND}-0.3V \sim V_{DD}+0.3V$
RS485 Signal Line Voltage (A, B)	$\pm 13V$
Operating (Ambient) Temperature	$-40^{\circ}C \sim 85^{\circ}C$
Storage Temperature	$-65^{\circ}C \sim 105^{\circ}C$

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of the device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

### Recommended Operating Conditions

For optimum performance, it is recommended that the Bridge operates within a voltage range of 3V~5.5V and an ambient temperature range of  $-40^{\circ}C \sim 85^{\circ}C$ .

## D.C. Electrical Characteristics

Ta=25°C, V<sub>DD</sub>=5V

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>DD</sub>	Operating Voltage	—	3.0	5.0	5.5	V
V <sub>IH</sub>	Input High Voltage	—	2.0	—	—	V
V <sub>IL</sub>	Input Low Voltage	—	—	—	0.8	V
I <sub>TX</sub>	TX Operating Current	UART (9600bps) transmits without intervals	—	36.5	—	mA
		UART (1000kbps) transmits without intervals	—	55.3	—	mA
I <sub>RX</sub>	RX Operating Current	STA=GND	—	2.5	—	mA

Note: In the TX mode, the operating current is measured without connecting the slave, otherwise the current will be influenced.

## A.C. Electrical Characteristics

Ta=25°C, V<sub>DD</sub>=5V

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
f <sub>CLK_RS485</sub>	Data Rate	—	—	—	1000	kbps

## Functional Description

### System Description

The BMB22M301 is an RS485 Bridge that can implement a data rate of up to 1000kbps. Up to 256 RS485 devices can be connected simultaneously on the bus. Five RS485 interfaces are reserved on the BMB22M301 to facilitate the connection of multiple RS485 devices. A terminal resistor interface is reserved, users can use the jumper to select whether to connect the resistor to the circuit.

### Operating Principles

The STA pin is used to select whether the Bridge transmits or receives an RS485 signal. The following are the BMB22M301 control tables:

- Pin control table (RS485 Bridge transmits an RS485 signal)

Input		Output	
STA	RX	B	A
1	1	0	1
1	0	1	0
0	x	High-Z	High-Z

- Pin control table (RS485 Bridge receives an RS485 signal)

Input	Output	
STA	A-B	TX
0	≥-0.05V	1
0	≤-0.2V	0
0	Open/shorted	1
1	x	High-Z

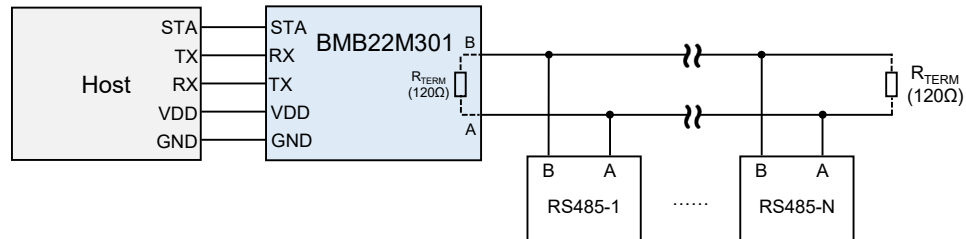
### Jumper

The jumper can be used to determine whether to connect a 120Ω terminal resistor to the circuit.

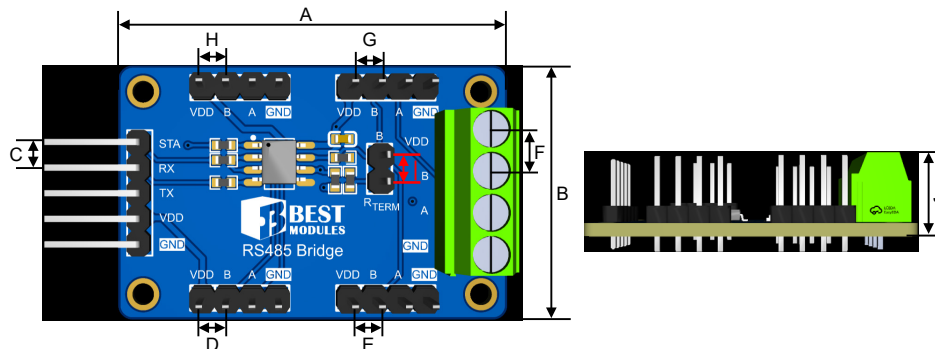
Jumper	Terminal Resistor
Shorted	Connected to the circuit
Open	Does not be connected to the circuit

- Note: 1. In the case of few devices, short distance and slow speed, the Bridge can also operate well without terminal resistor.  
2. When the communication distance is long and the speed is high, the terminal resistor can prevent signal reflection and echo, thus improving the communication quality.

### Application Circuits



### Dimensions



Symbol	Unit	mm	inch
A (Length)		40	1.57
B (Width)		26	1.02
C (Pin pitch)		2.54	0.1
D (Pin pitch)		2.54	0.1
E (Pin pitch)		2.54	0.1
F (Pin pitch)		3.5	0.14
G (Pin pitch)		2.54	0.1
H (Pin pitch)		2.54	0.1
I (Pin pitch)		2.54	0.1
J (Height)		10.4	0.41

## Reference Information

### Revision History

Date	Author	Issue	Modification Information
2024.12.10	王靖鈞	V1.00	First version

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