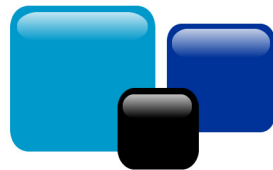


## RS232 RS485 LOGIC CONVERTER MODULE – BM002

OPEN SOURCE HARDWARE MODULE



hardware made easy

# Solutions Cubed

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Solutions Cubed is an innovative electronic design firm. We have created successful designs for a myriad of industries including mass produced consumer products, deep-sea robotic components, and encrypted encoders for the banking industry. We love meeting new customers and are interested in hearing about your design needs.

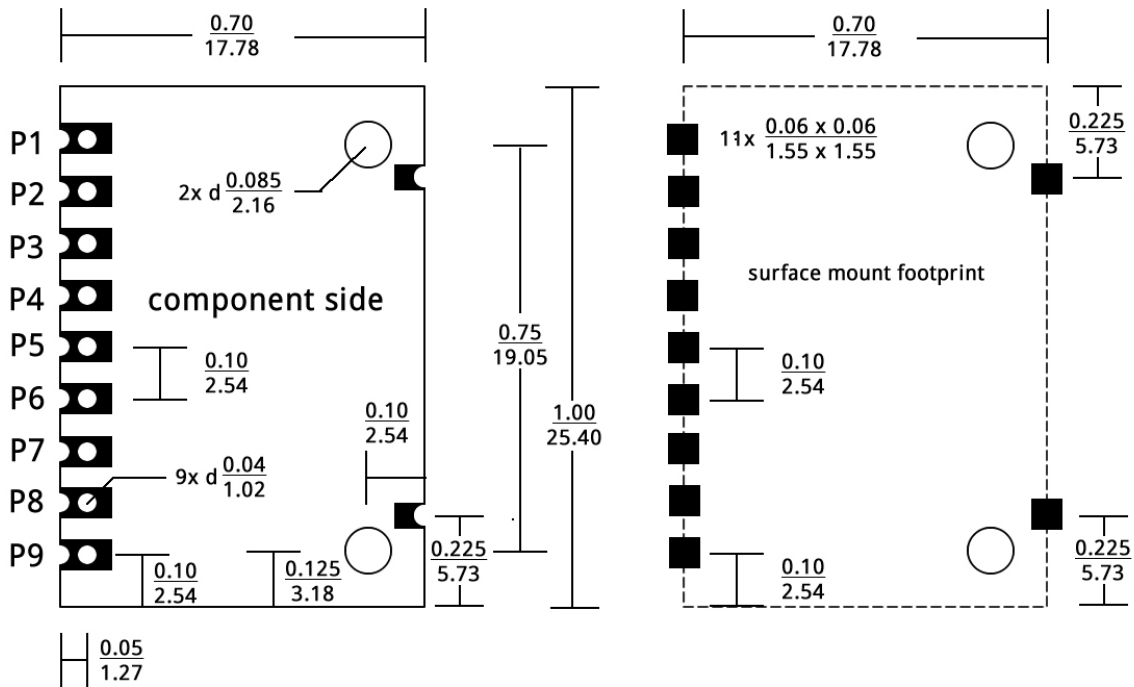
**Product Description:**

This breakout board combines a number of ICs to provide a convert to/from RS232, RS485, and logic level serial signals.

- Converts from RS232 to RS485, or RS232 to logic level, or RS485 to logic level
- Built-in drive enable allows 2 line RS485 communication
- External drive enable connection allows for standard RS485 communication
- Low-cost module provides for highly versatile communication links
- Operates at 3.0-5.5VDC

**Dimensions:**

9-pin SIP Mechanical Dimensions inches  
mm



**Specifications:**

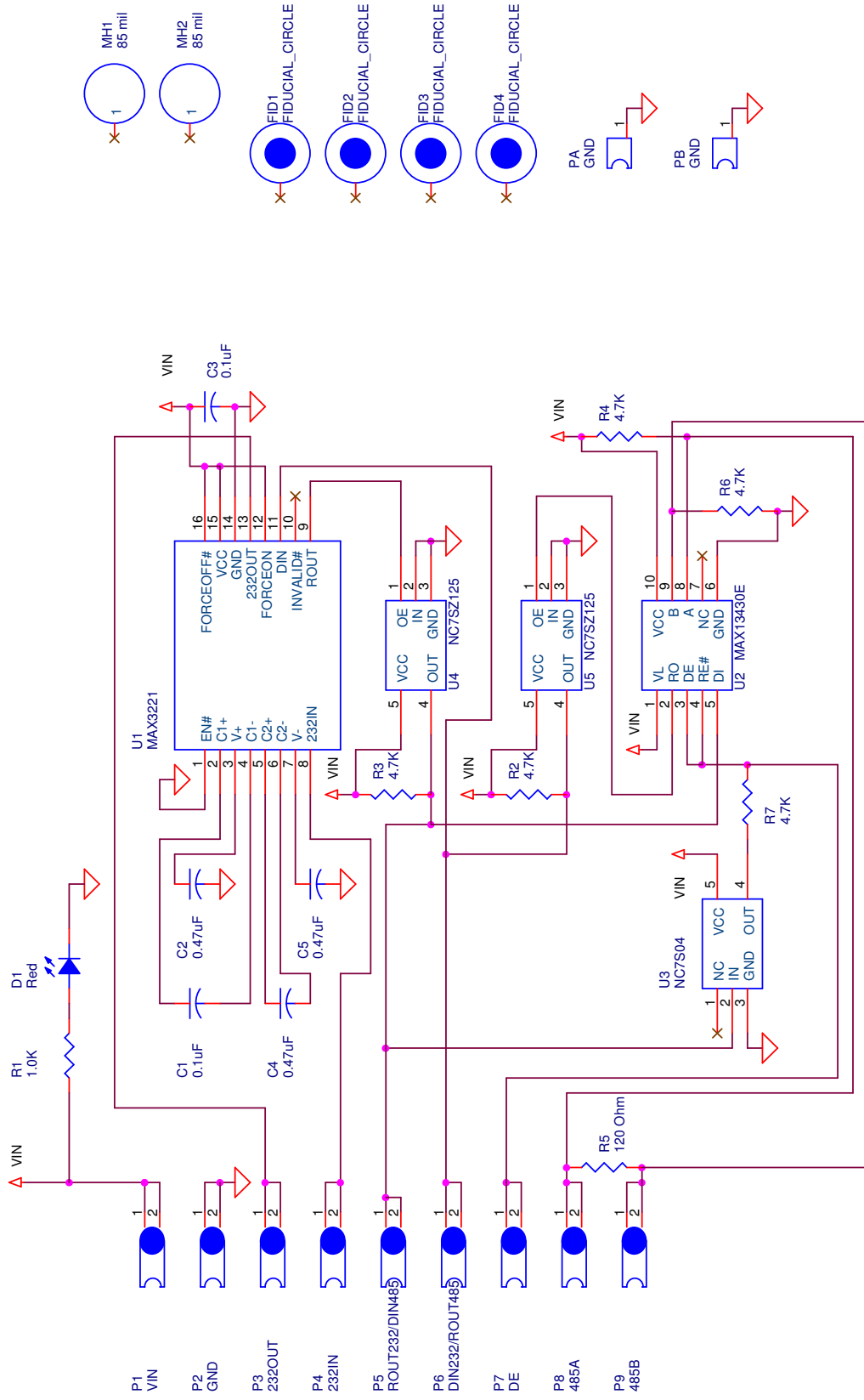
| Characteristic        | Min  | Typ | Max    | Unit | Notes   |
|-----------------------|------|-----|--------|------|---|
| Operating voltage     | 3.0  |     | 5.5    | V    |   |
| Operating current     | 2.5  |     | 5.5    | mA   | See notes on reducing current                       |
| Operating temperature | -0   |     | +70    | °C   |   |
| Baud rates            | 1200 |     | 115200 | bps  | Module tested for this range, other speeds may work |

**Pin Functions and Notes**

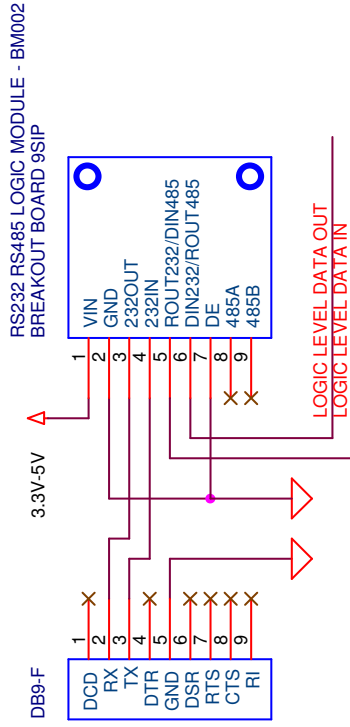
| # | Name           | Maximum Voltage | Notes  |
|---|----------------|-----------------|--|
| 1 | VIN            | 5.5V            | Power input. This is the power supply input for the module. It should be between 3.3V and 5V   |
| 2 | GND            | 0V              | Ground return.   |
| 3 | 232OUT         | +/- 5.4V        | RS232 output. Serial data is sent via the RS232 IC on this pin.  |
| 4 | 232IN          | +/- 25V         | RS232 input. Serial data at RS232 levels being received by this module should connect to this pin.   |
| 5 | ROUT232/DIN485 | 5.5V            | Logic input/open-collector output. This pin serves two functions. First, data received out of the RS232 IC appears on this pin. It is buffered through an open-collector buffer with the output pulled high through a 4.7kΩ resistor. Second, the pin is the serial data input to the RS485 driver IC.   |
| 6 | DIN232/ROUT485 | 5.5V            | Logic input/open-collector output. This pin serves two functions. First, the pin is the serial data input to the RS232 driver IC. Second, data received out of the RS845 IC appears on this pin. It is buffered through an open-collector buffer with the output pulled high through a 4.7kΩ resistor.   |
| 7 | DE             | 5.5V            | Logic input. The module uses the ROUT232/DIN485 logic state to drive the RS485 IC drive enable pin. If you are not externally controlling the RS485 IC's drive state this pin should be left floating. Since the connection to the IC's drive enable is also pulled out to this pin you may override the module's circuitry. A logic 0 places the RS485 IC in receive mode, while a logic high places it in drive mode. Any circuit connected to this pin should be capable of sinking or sourcing at least 1mA. |
| 8 | 485A           | -8V to +13V     | RS485 input/output   |
| 9 | 485B           | -8V to +13V     | RS485 input/output   |

**User Notes/Tips**

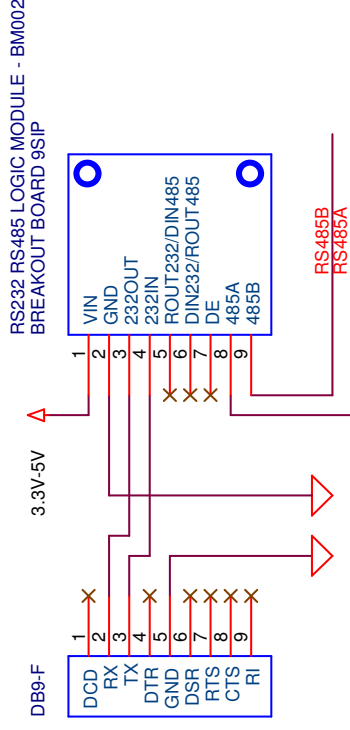
- The majority of the current this module draws is used to light the LED, D1. Removing this LED or its current limiting resistor (R1), will reduce the operating significantly.
- RS485 Drive Enable Operation: Simple circuitry inverts the data sent to the RS485 IC (pin ROUT232/DIN485) allowing serial data to be transferred without a third pin controlling the RS485 drive enable. However, this function can clip data signals or create short low pulses in some cases. If these create an issue you can slow down the serial data rate, add some capacitance to pin 7 (DE, 220pF should work), or drive the DE pin directly.
- RS485 Channel A/B: Simple circuitry inverts the data sent to the RS485 IC (pin ROUT232/DIN485) allowing serial data to be transferred without a third pin controlling the RS485 drive enable. For this to function the RS485 IC only "drives" logic 0's. To place logic 1 on the line the RS485 IC is placed in receive mode, and resistors ensure the voltages on the A/B connections are pulled to a logic 1.



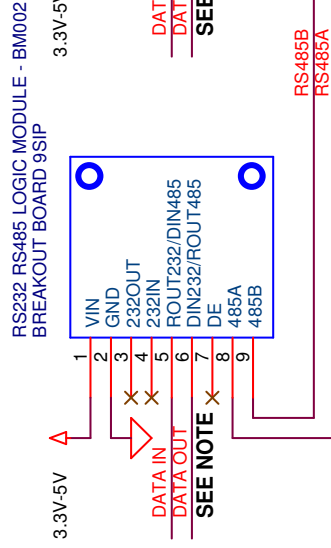
**SERIAL PORT RS232 TO LOGIC LEVEL CONVERSION**



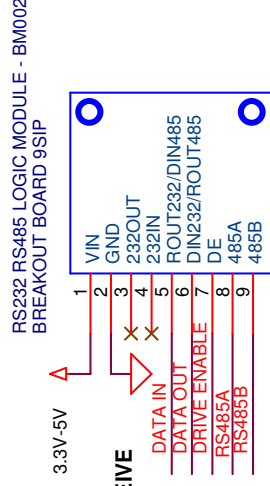
**SERIAL PORT RS232 TO RS485 CONVERSION**



**LOGIC LEVEL TO RS485 BUS CONSTRUCTION**



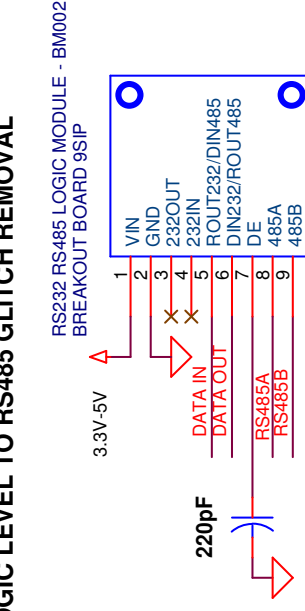
**LOGIC LEVEL TO RS485 USING DRIVE ENABLE**



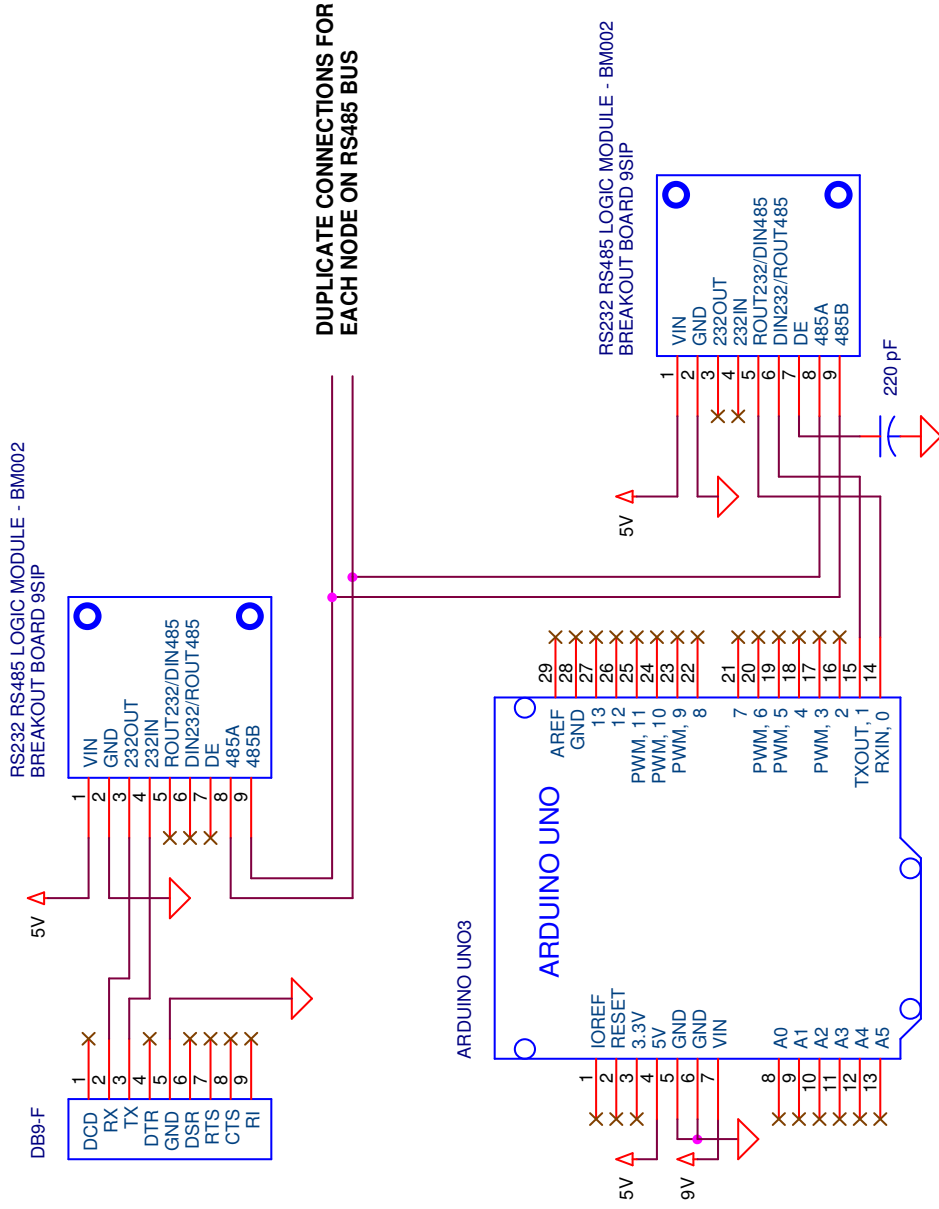
**NOTE\*\* LOGIC LEVEL TO RS485 GLITCH REMOVAL**

GLITCHES CAN APPEAR ON THE RS485ROUT LOGIC PIN. IF THESE IMPACT YOUR SYSTEM A 220pF CAPACITOR CAN REMOVE THEM.

ALTERNATIVELY, THE DE PIN MAY BE DRIVEN DIRECTLY TO USE THE RS485 INTERFACE



**ARDUINO RS485 BUS WITH SERIAL PORT**



**OPTIONAL CAP CAN REDUCE GLITCHES ON RS485OUT LINE IF THEY IMPACT UART**