RS485 Isolator

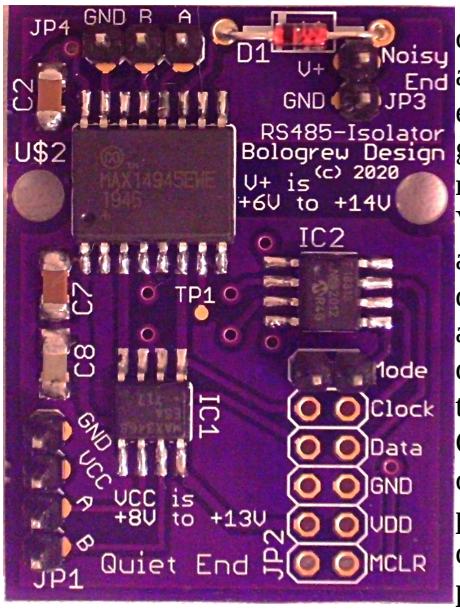
Manual Version 1.1

Theory of operation

This module is a half-duplex protocol-independent RS485 isolator and repeater capable of a maximum of 115200bps. It is ideal for isolating a noisy device like a Variable Frequency Drive from other devices on the bus. The “noisy” and “quiet” sides of the module are electrically isolated and terminate that segment of the RS485 bus with the appropriate termination resistor. The signals are decoded and regenerated so that the signals are propagated but the noise is not.

Initially, both the quiet and noisy sides of the module are in receive mode. When the start of a data packet is detected on either side of the module, the opposite side of the module is switched into transmit mode. After a defined delay after the last data bit transition, both sides of the module switch back into receive mode.

Connection



This module requires two independent power supply connections. The “quiet” side needs a supply of +8V to +13V and the “noisy” side, which would communicate with noisy equipment like a VFD, needs a supply of +6V to +14V. The two grounds are independent and must not be connected together. It may be tempting to use a power supply source available from a VFD to power the noisy side but this is not recommended unless additional regulation, protection and smoothing is used (Zener diode, voltage regulator, etc.). Use of a clean supply like that of a rechargeable 9V battery is recommended. Maximum current drawer of the noisy side is only 12.5mA. The power supply on the quiet side should already be stable and noise-free.

Cat 5 cable, particularly shielded versions, can be used to connect the module to the other RS485 devices. Use one twisted pair for each connection to maximise the effectiveness of the differential signal. Spare conductor pairs can be used to transmit power to the module. The module should be positioned close to the noisy device(s) to minimise noise radiation from the cable but not directly next to and the module should not be housed in a metal case as that can reduce the effectiveness of the isolation. On the noisy end, only connect its ground to the ground of the noisy piece of equipment if absolutely necessary.

Receive reset delay adjustment

The time delay before the transmitting side returns to receive mode can be adjusted if required. The default time delay is 8ms. It can be set from 2ms to 32ms in 2ms steps. Connect an RS485 interface to the quiet side and disconnect any connections to the noisy side. Fit a jumper to the “Mode” header and power up the module. Use terminal software using half-duplex, 9600bps, 1 start bit and 1 stop bit to communicate. The module will send:

0-9|A-F = 2-32ms
3>

Type “0” to “9” or “A” to “F” corresponding to 2ms to 32ms and press return. The new delay value will be range checked and, if acceptable, stored in flash memory. The command prompt will then reflect the new delay value. Power down the module and remove the mode jumper. The next time the module is powered up, the new delay value will be used.