

INTRODUCTION:

Connecting a PC to your MicroConverter chip for downloading or debugging code requires an RS-232 line driver/receiver chip to step the UART's CMOS logic levels up RS-232 levels. If you don't already have an RS-232 chip in on your MicroConverter design, this "4-wire UART" dongle can greatly simplify PC-to-MicroConverter connection allowing no-hassle in-system download/debug access without adding components to your board.

IMPLEMENTATION:

The circuit of Figure 2 is nothing more than a standard RS-232 line driver/receiver block. In many applications (and on MicroConverter evaluation boards) this circuit, or one very much like it, is included on the same PC board as the MicroConverter itself. As shown in Figure 1, however, the RS-232 transceiver circuit sits on a tiny board connected by a 9-pin D-SUB (J1) to a PC's serial port. The 4-conductor ribbon cable at the other end of this small board can be connected directly to 4 pins of the MicroConverter, allowing a simple pin-header on the MicroConverter board to provide full download/debug access to the chip. In addition to carrying the MicroConverter's RxD & TxD (UART receive & transmit) signals, the ribbon cable carries the MicroConverter's V_{DD} line to power the RS-232 chip, thus avoiding the need for an additional power source.

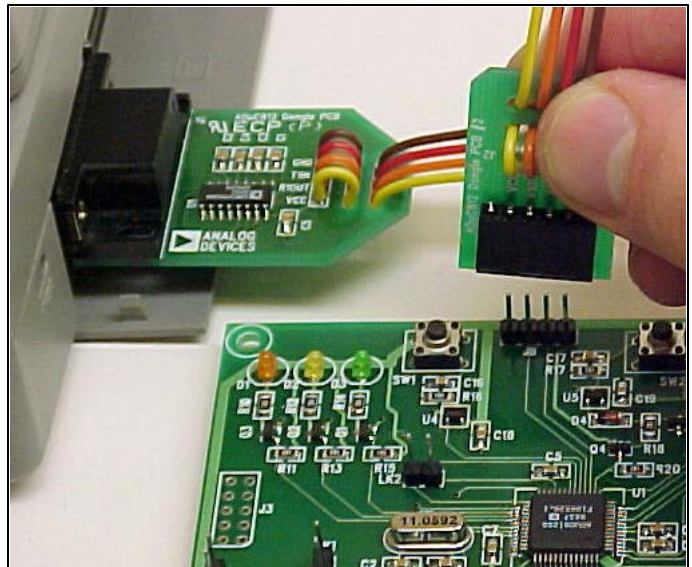


Figure 1: Connecting for Download or Debug

WHAT ABOUT RS-485?

So we've described a simple solution for downloading and debugging MicroConverter code in designs without any resident networking hardware of any kind. But what about designs that feature resident networking hardware other than RS-232 (such as RS-485)? Simply adding the RS-232 connection could cause contention in these cases. One solution to this dilemma is illustrated in Figure 3. Basically, you just add two extra pins (RE & DE) to

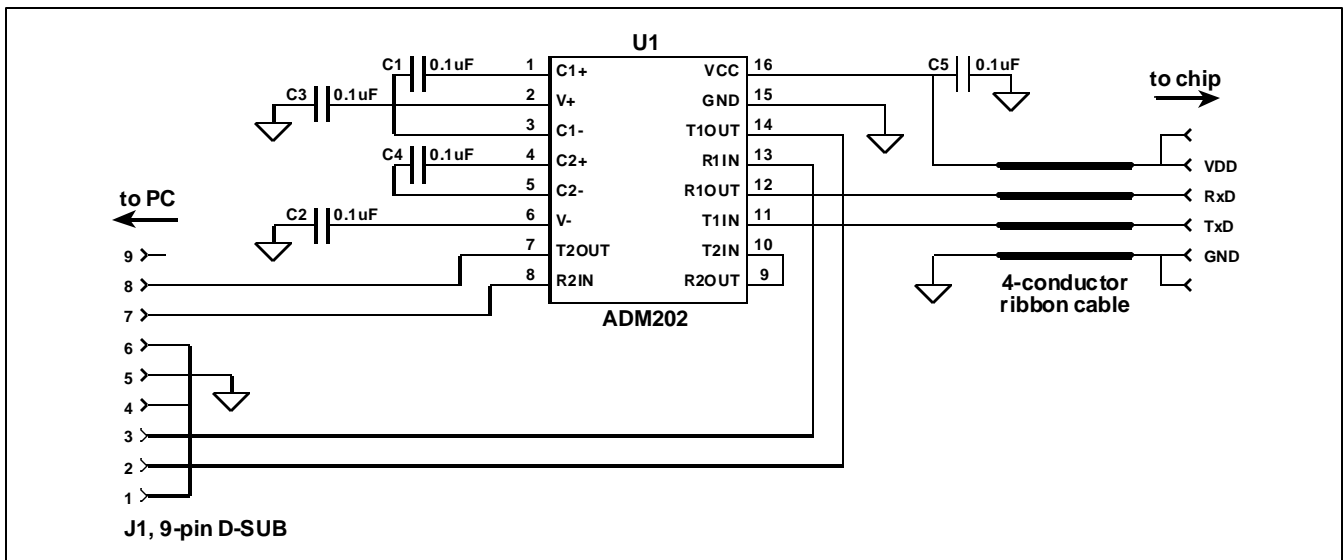
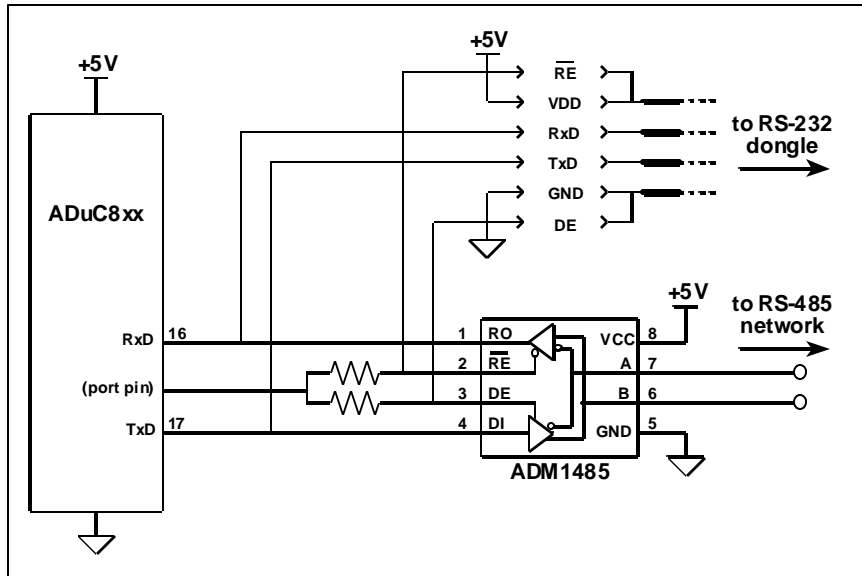


Figure 2: Schematic of the "UART Dongle"

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MicroConverter® Technical Note – uC006 A 4-wire UART-to-PC Interface



the RS-232 dongle header, and use these pins to automatically disable the RS-485 chip whenever the RS-232 dongle is inserted.

During normal operation, the dongle is left open and RS-485 communication goes on unimpeded. But by inserting the RS-232 dongle, RE and DE get pulled to V_{DD} and ground respectively, thereby automatically disabling the RS-485 transceiver to allow RS-232 communications.

BOARDS:

Simple board layouts for the RS-232 dongle PC-board are given below.

Figure 3: RS-232 Download Option for RS-485 Enabled System

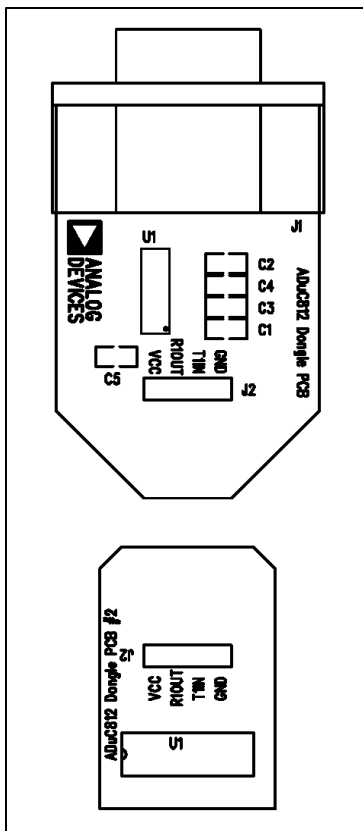


Figure 4: Silk Screen

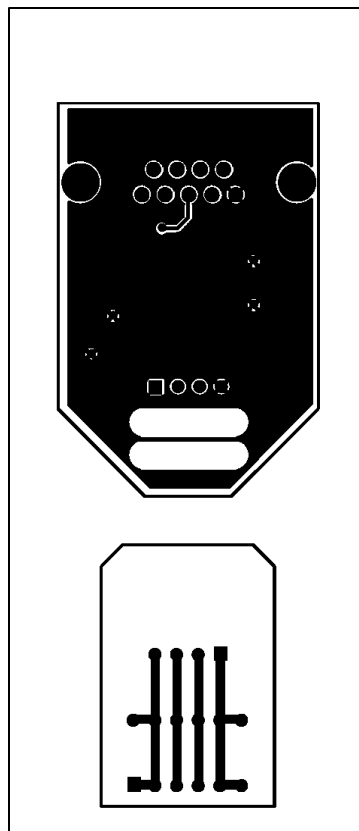


Figure 5: Solder Side

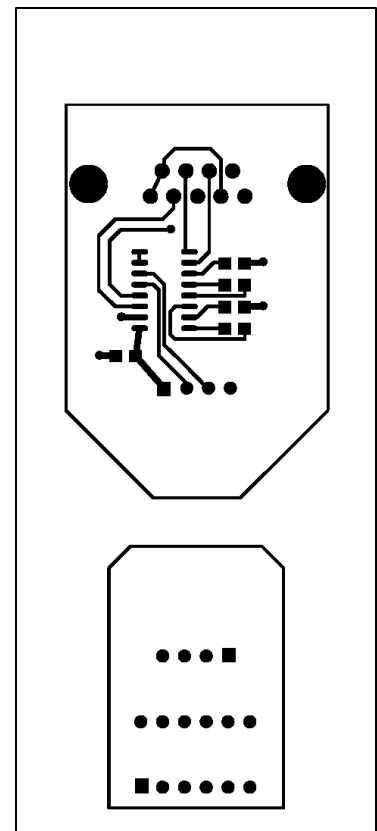


Figure 6: Component Side