



ALTELECTRONICS USB TO RS485 UART SERIAL CONVERTER

Datasheet

Document Reference No.: ALT_00001
Version 1.0
Issue Date: 23-06-11



1 Description

The USB-RS485-PCB is a USB to RS485 level serial UART converter PCB incorporating FTDI's FT232RQ USB to Serial UART interface IC device which handles all the USB signalling and protocols. The converter provides a fast, simple way to connect devices with a RS485 interface to USB.

Each USB-RS485 converter contains a small internal electronic circuit board, using the FT232R plus an USB type-A connector. The FT232R datasheet, DS_FT232R, is available at <http://www.ftdichip.com>.

The integrated electronics also include an RS485 transceiver plus Tx and Rx LEDs which give a visual indication of UART traffic.

The converter is USB powered and USB 2.0 full speed compatible. Each converter supports a data transfer rate up to 3 Mbaud and supports the FTDIChip-ID™, with a unique USB serial number programmed into the FT232R. This feature can be used to create a security or password protected file transfer access using the converter. Further information and examples on this feature are available at <http://www.ftdichip.com> under FTDIChip-ID Projects.

The USB-RS485 converter requires USB drivers, available free from <http://www.ftdichip.com>, which are used to make the FT232R on the PCB appear as a virtual COM port (VCP). This then allows the user to communicate with the USB interface via a standard PC serial emulation port (for example TTY). Another FTDI USB driver, the D2XX driver, can also be used with application software to directly access the FT232R on the converter through a DLL.

1.1 Part Number

The following gives details of the USB-RS485 converter:

Part Number	Description
USB-RS485-CONV	USB to RS485 level UART Converter

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2 Typical Applications

- * USB to Serial RS485 Level Converter.
- * Upgrading Legacy Peripherals to USB.
- * Interface Microcontroller UART or I/O to USB.
- * Interface FPGA / PLD to USB.
- * USB Instrumentation PC interface.
- * USB Industrial Control.
- * USB password protected file transfers.

2.1 Driver Support

Royalty free VIRTUAL COM PORT (VCP) DRIVERS for...

Windows 98, 98SE, ME, 2000, Server 2003 and Server 2008 Windows XP and XP 64-bit
Windows Vista and Vista 64-bit Windows XP

Embedded Windows CE 4.2, 5.0 and 6.0 Mac OS 8/9, OS-X Linux 2.4 and greater

Royalty free D2XX Direct Drivers (USB Drivers + DLL S/W Interface)

Windows 98, 98SE, ME, 2000, Server 2003 and Server 2008

Windows XP and XP 64-bit Windows Vista and Vista 64-bit Windows XP

Embedded Windows CE 4.2, 5.0 and 6.0 Linux 2.4 and greater Mac OS-X

The drivers listed above are all available to download for free from www.ftdichip.com.

Various 3rd Party Drivers are also available for various other operating systems – see www.ftdichip.com for details.

2.2 Features

USB-RS485-PCB provides a USB to RS485 Serial UART interface.

Entire USB protocol handled by the electronics on the PCB.

EIA/TIA-485 interface with low power requirements.

UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity.

Data transfer rates up from 300 baud to 3 Mbaud.

Internal EEPROM with user writeable area.

FTDI's royalty-free VCP allow for communication as a standard emulated COM port and D2XX, direct drivers provide DLL application programming interface.

Support for FT232R FTDIChip-ID™ feature for improved security.

PCB is USB Powered – no external supply required.

X-On / X-Off software handshaking Low USB bandwidth consumption.

UHCI / OHCI / EHCI host controller compatible. USB 2.0 Full Speed compatible.

-40°C to +85°C operating temperature range.

RoHS compliant ESD Protection for RS-485 I/O's

±15kV Human Body Model (HBM)

±15kV EN61000-4-2 Air Gap Discharge

±8kV EN61000-4-2 Contact Discharge



3 Features of FT232R applicable to USB-RS485-Converter

The USB-RS485 converter uses FTDI's FT232RQ USB to serial IC device.

This section summarises the key features of the FT232RQ which apply to the USB-RS485-CONV.

For further details, and a full features and enhancements description consult the FT232R datasheet, this is available from www.ftdichip.com. Internal EEPROM. The internal EEPROM is used to store USB Vendor ID (VID), Product ID (PID), device serial number, product description string and various other USB configuration descriptors. Each USB-RS485-PCB is supplied with the internal EEPROM pre-programmed as described in Appendix A – PCB EEPROM Configuration. The internal EEPROM descriptors can be programmed in circuit, over USB without any additional voltage requirement. It can be programmed using the FTDI utility called FT_Prog, which can be downloaded from the FTDI website (<http://www.ftdichip.com/Support/Utilities.htm>). Additionally, there is a user area of the internal EEPROM available to system designers to allow storing of data (note that this is not modified by FT_Prog).

Lower Operating and Suspend Current. The FT232R has a low 15mA operating supply current and a very low USB suspend current of approximately 70µA.

Low USB Bandwidth Consumption. The USB interface of the FT232R, and therefore the USB-RS485- PCB has been designed to use as little as possible of the total USB bandwidth available from the USB host controller.

FTDICHIP-ID™. The FT232R includes the new FTDICHIP-ID™ security dongle feature. This FTDICHIP-ID™ feature allows a unique number to be burnt into each FT_232RQ during manufacture. This number cannot be reprogrammed. This number is only readable over USB can be used to form the basis of a security dongle which can be used to protect any customer application software being copied. This allows the possibility of using the USB-RS485-PCB as a dongle for software licensing. Further to this, a renewable license scheme can be implemented based on the FTDICHIP-ID™ number when encrypted with other information. This encrypted number can be stored in the user area of the FT232R internal EEPROM, and can be decrypted, then compared with the protected FTDICHIP-ID™ to verify that a license is valid. Web based applications can be used to maintain product licensing this way. An application note, AN232R-02, available from FTDI website (www.ftdichip.com) describes this feature.

Extended Operating Temperature Range – The USB-RS485-CONV is capable of operating over an extended temperature range of -40° to +85°C thus allowing it to be used in automotive or industrial applications.

4 Signal Integrity Tests

Test conditions:

Cable: 30 meters of twisted pair subsea grade cable 120 ohm terminated.

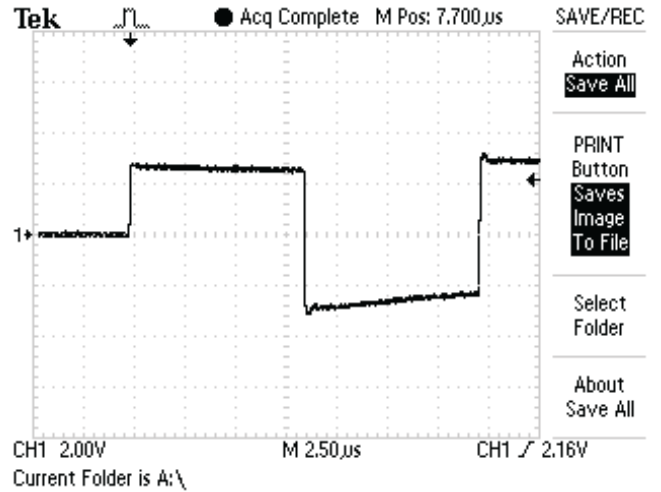
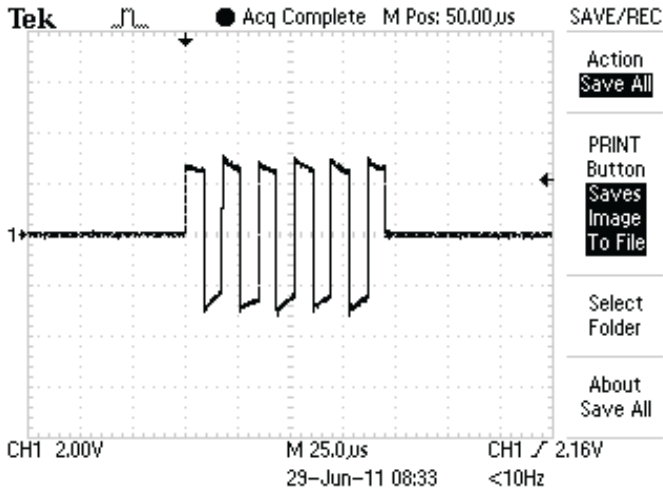
Driver: USB-RS485 Adaptor with the 120 ohm terminator jumper ON.

The character 'U' (ASCII 0x55) sent via a terminal (PUTTY) with 8 bits data, 1 start bit, 1 stop no parity.

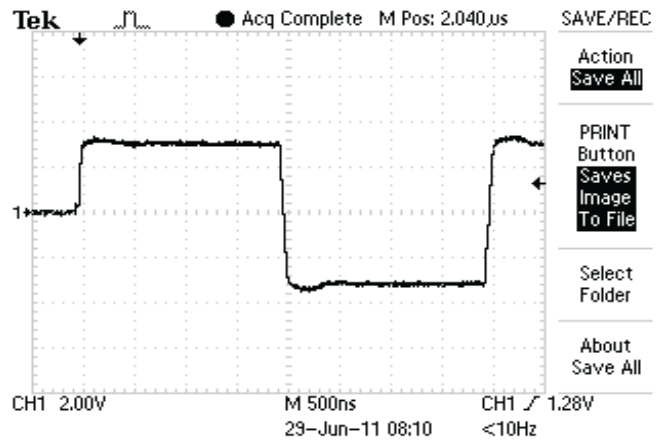
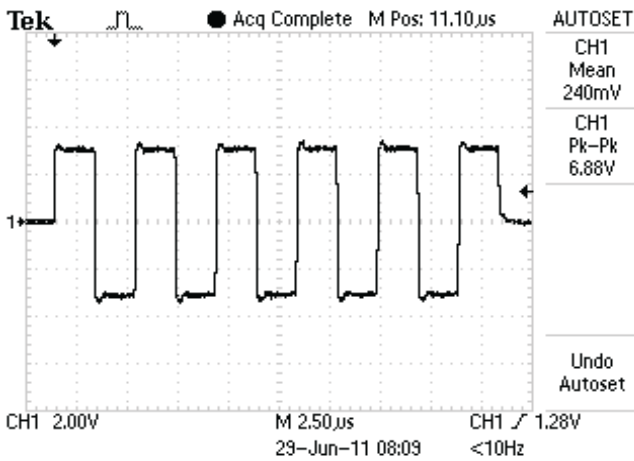
The baud rate was set to: 115200 bps, 50000bps, and 1Mbps, the waveforms were captured with a 1Gs/s digital storage scope triggered on the start bit.



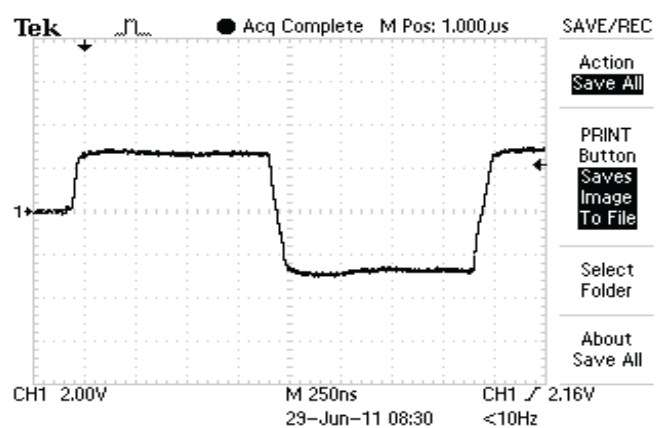
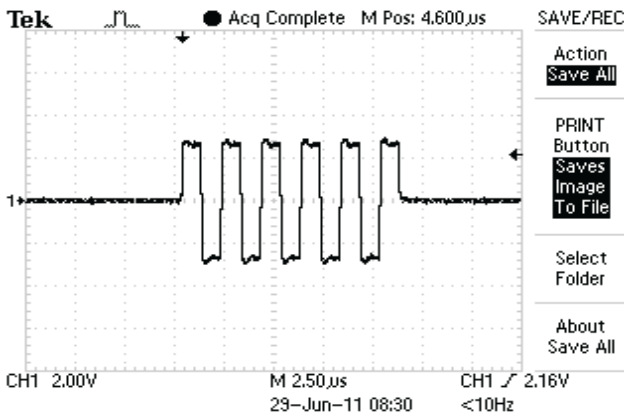
4.1 Signal Sampled at 115200 bps



4.2 Signal Sampled at 500000 bps



4.3 Signal Sampled at 1Mbit/s





6 Connections Description

