



Introduction

The Low-speed USB/RS232 Evaluation Kit (STEVAL-PCC02V1) has been created to provide a complete reference design for a serial port bridge as well as an evaluation board for ST72F63B/60 devices in QFN40 package. This application is used to interface between devices with a serial port (RS-232 type) and a host computer USB port. USB data transfers comply with HID-class protocols.

The bridge is based on a USB low-speed microcontroller manufactured by STMicroelectronics which provides a maximum guaranteed USB transfer rate of 800 bytes per second. Flow control has therefore been implemented to ensure data transfer integrity when interfacing with the serial port at rates up to 38400 bits per second (bps).

The bridge application is evaluated on a PC by running a dedicated applet that controls and monitors data transfers on both the USB and serial COM ports.

The included hardware provides In-Circuit Programming (ICP) capabilities for the microcontroller and almost all the MCU's I/Os are available on expansion connectors to evaluate different applications.

The RS-232 part can be separated by removing the appropriate soldering joints (shunts). This can be used to modify certain firmware or hardware parameters for evaluation or customization purposes.

The following development tools can be ordered separately: assembler, linker, C compiler, source level debugger, hardware emulator, programming boards and gang programmer. For ordering information, see our website at <http://www.st.com/mcu> or contact your local sales office.

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1 Getting started

1.1 System requirements

In order to use the Low-speed USB/RS232 Evaluation Kit with the Windows operating system, a recent version of Windows, such as Windows 98, Windows Millennium or Windows 2000 must be installed on the PC.

The version of the Windows OS installed on your PC may be determined by clicking on the "System" icon in the Control Panel.

Important: When running the HID evaluation board applet provided in the package, verify that the correct version of the HID.dll file is installed:

- Windows 98: HID.dll - Version 4.10.1998
- Windows 98 SE: HID.dll - Version 4.10.2222
- Windows Millennium: HID.dll - Version 4.90.300.1
- Windows 2000: HID.dll - Version 5.00.2134.1
- Windows XP: HID.dll - Version 5.1.2600.0

1.2 Package contents

The Low-speed USB/RS232 Evaluation Kit includes the following items:

Hardware content

- One evaluation board with ICC, USB and Serial connectors.
- One soldered ST72F60K2U1 low-speed USB microcontroller device (QFN40 package).
This is a FLASH device allowing up to 100 reprogramming cycles. The ST72F60K2U1 is delivered already programmed with the evaluation firmware.

Software contents (Contact the Sales Office or www.st.com for the most recent version)

- PC executable software for evaluating the USB/Serial Port Bridge. The source file, written in Delphi, is provided as an application example using the HID driver.
- ST7 firmware (C source code) for the ST72F60/63B

Documentation (Contact the Sales Office or www.st.com for the most recent version)

- ST7260 and ST7263B datasheets
- PCB production data
- ST7263B/ST7260 flyer
- This Getting Started Manual

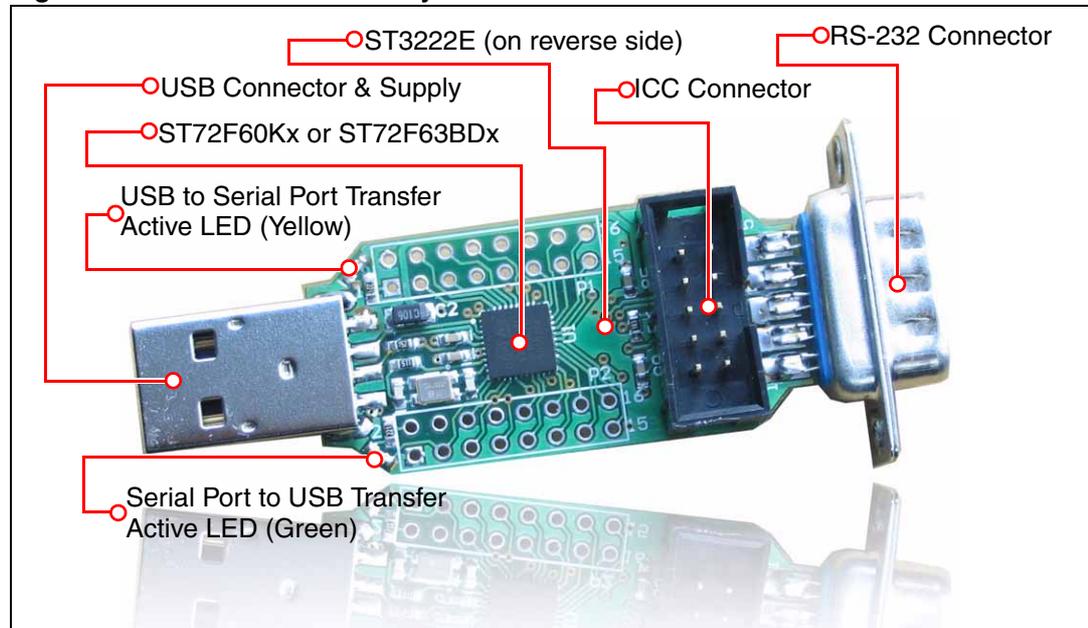
1.3 Software installation

Install the Bridgels.exe file on your computer.

1.4 Hardware installation

Figure 1 shows the location of the main components of the evaluation board. The schematic drawing is given in *Figure 6: Low-speed USB/RS232 Evaluation Board schematics on page 10*.

Figure 1. Evaluation Board Layout



1.4.1 Power supply

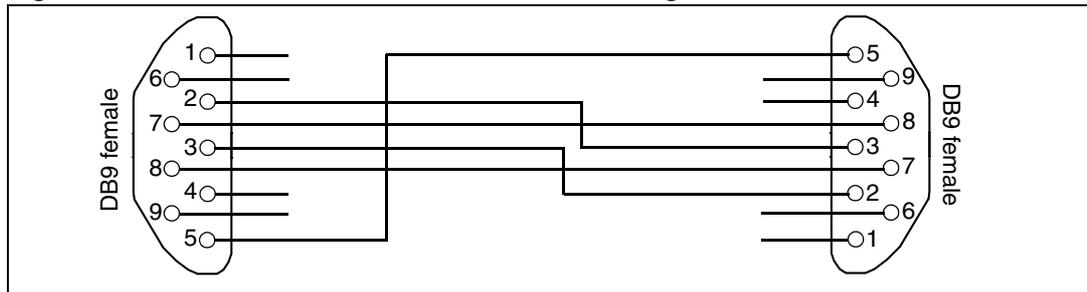
The Low-speed USB/RS232 Evaluation Board is directly supplied by the USB Connector (bus-powered) and therefore does not require an external voltage supply.

1.4.2 Data transfer via PC serial port

When connected to a PC serial port for data transfer purposes, a DTE (Data Terminal Equipment) to DTE configuration is required. As a result, a cross-wired RS-232 cable must be used as shown in *Figure 2*.

The Low-speed USB/RS232 Evaluation Board is equipped with two LEDs that display the data transfer status:

- Yellow/Orange LED: USB to Serial Bus transfer is active,
- Green LED: Serial Bus to USB transfer is active.

Figure 2. Cross-wired serial cable connection diagram

1.4.3 In-Circuit Communication (ICC)

The 10-pin connector must be connected to a programming tool in order to program or erase the microcontroller Flash memory.

For further information, please refer to both the *ICC Protocol Reference Manual* and the *ST7 Flash Programming Reference Manual*, available online from <http://www.st.com/mcu>

Note: The USB cable must be plugged in to supply the board with voltage.

2 Running the Low-speed USB/RS232 Evaluation Kit

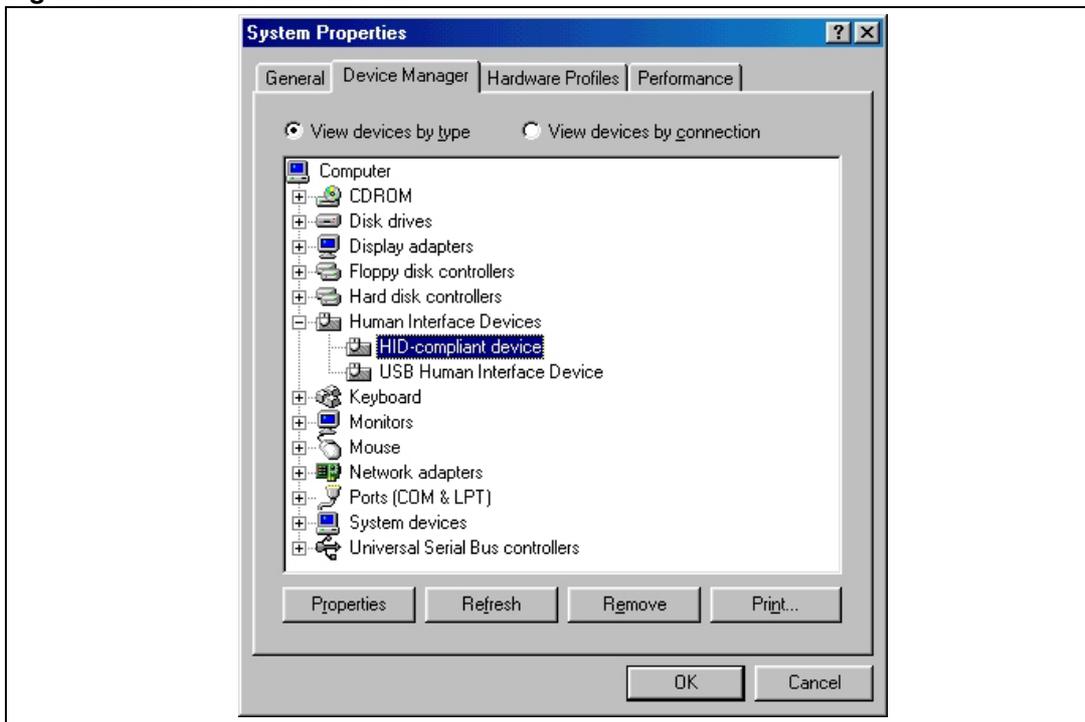
2.1 Introduction

The Low-speed USB/RS232 Evaluation Kit consists of two main parts:

- the physical board,
- the Low-speed USB/RS232 Evaluation software running on your PC.

First, connect the evaluation board to the PC via the USB cable. As a result, the evaluation board is enumerated as a USB HID device as shown [Figure 3](#), and is ready to use. You may be required to insert your Windows CD-ROM.

Figure 3. Enumeration Result



When you start the Low-speed USB/RS232 Evaluation program on the PC, a graphical interface is displayed for controlling and monitoring the data transfers on the USB and serial ports of the PC. This PC software is also used to evaluate the enumeration process and to set the communication parameters.

2.2 Low-speed USB/RS232 evaluation program

2.2.1 Device Selection

USB Enumeration

The Device Selection window, shown in [Figure 4](#), displays the following information:

- Available USB HID devices
All applicable devices connected to the PC are displayed in this window. The ST7 RS232 USB Bridge is displayed if the enumeration has been successfully completed.
- Device information
This information, obtained during the enumeration phase, refers to the highlighted device in the “Available Devices” window: Vendor ID, Product ID and Version numbers.

(Refer to the *USB Specification* version 1.1 or higher). Additionally, as string information is supported, the Manufacturer name, Product and Serial Number are displayed.

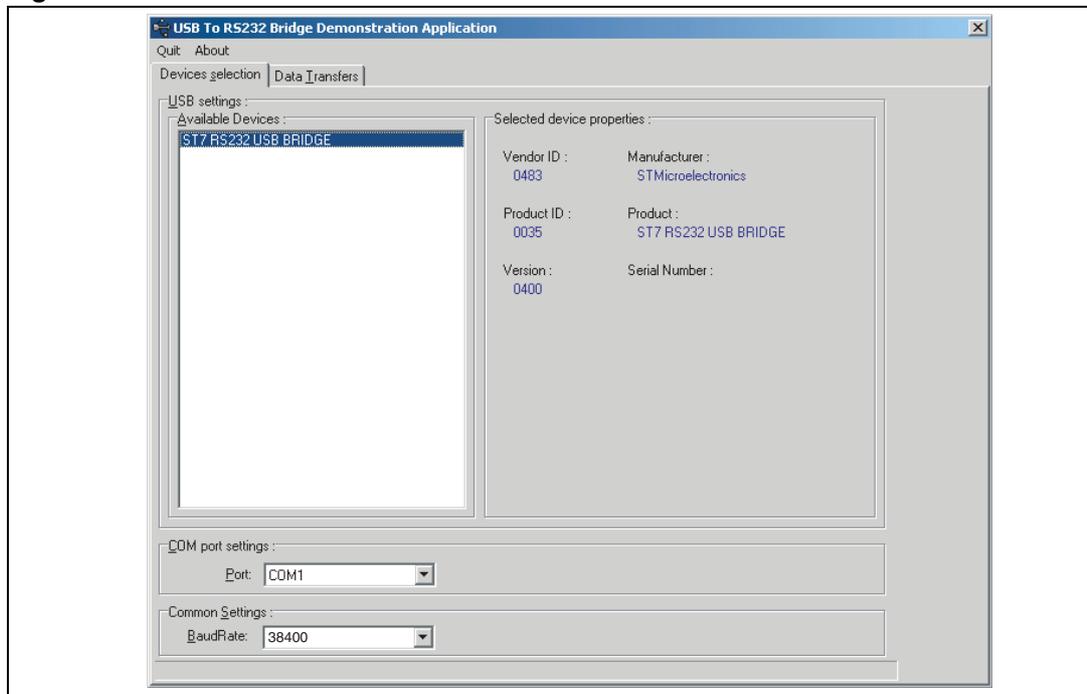
COM port settings

This function selects the COM port used by the Low-speed USB/RS232 Evaluation program to emulate a serial port communication. The selection **None** is not fully implemented in version 1.0.0 of the evaluation software.

Common settings

This function is used to select the baudrate of the bridge in the bridge firmware. If the applet is used to emulate the serial port, it also configures the COM port of the PC. Otherwise, the serial port baudrate must be defined as the same value in the other applet or device. The maximum applicable baudrate for this board is 38400 bit/s.

Figure 4. Device Selection Window



2.2.2 Data Transfers

Serial Port

The two following items do not apply if **None** has been selected in the “**COM Port Setting**” box of the Device Selection window.

- PC Flow Control defines the flow control method used by the COM port when the applet controls the COM port of the PC.
- Automatic received (USB) to sent (Serial) comparison verifies that the data received by the USB port is equal to the data sent by the COM port of the PC.
- Loop: Send Serial, Receive USB is used to perform serial to USB transfers in Loop mode. Unchecking this box during the data transfer aborts the transfer.

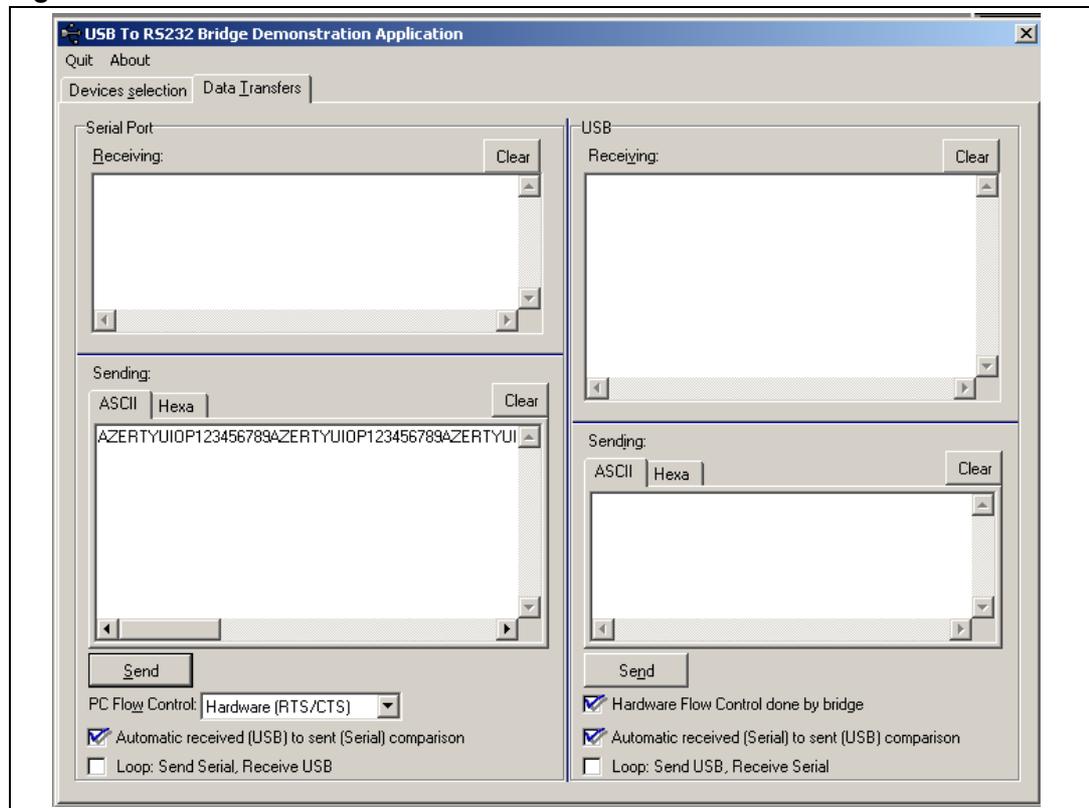
If the serial port is handled by another applet or PC, the Automatic received... box must not be checked and the Loop box must be checked, depending on the required configuration.

USB Port

These items are validated only if the bridge is connected to the USB port.

- Hardware Flow Control done by bridge is used to enable/disable the RTS/CTS flow control performed by the bridge on the serial port.
- Automatic received (Serial) to sent (USB) comparison verifies that the data received by the serial port is equal to the data sent by the USB port.
- Loop: Send USB, Receive Serial is used to is used to perform USB to serial transfers in Loop mode. Unchecking this box during the data transfer aborts the transfer.

Figure 5. Data Transfer Window



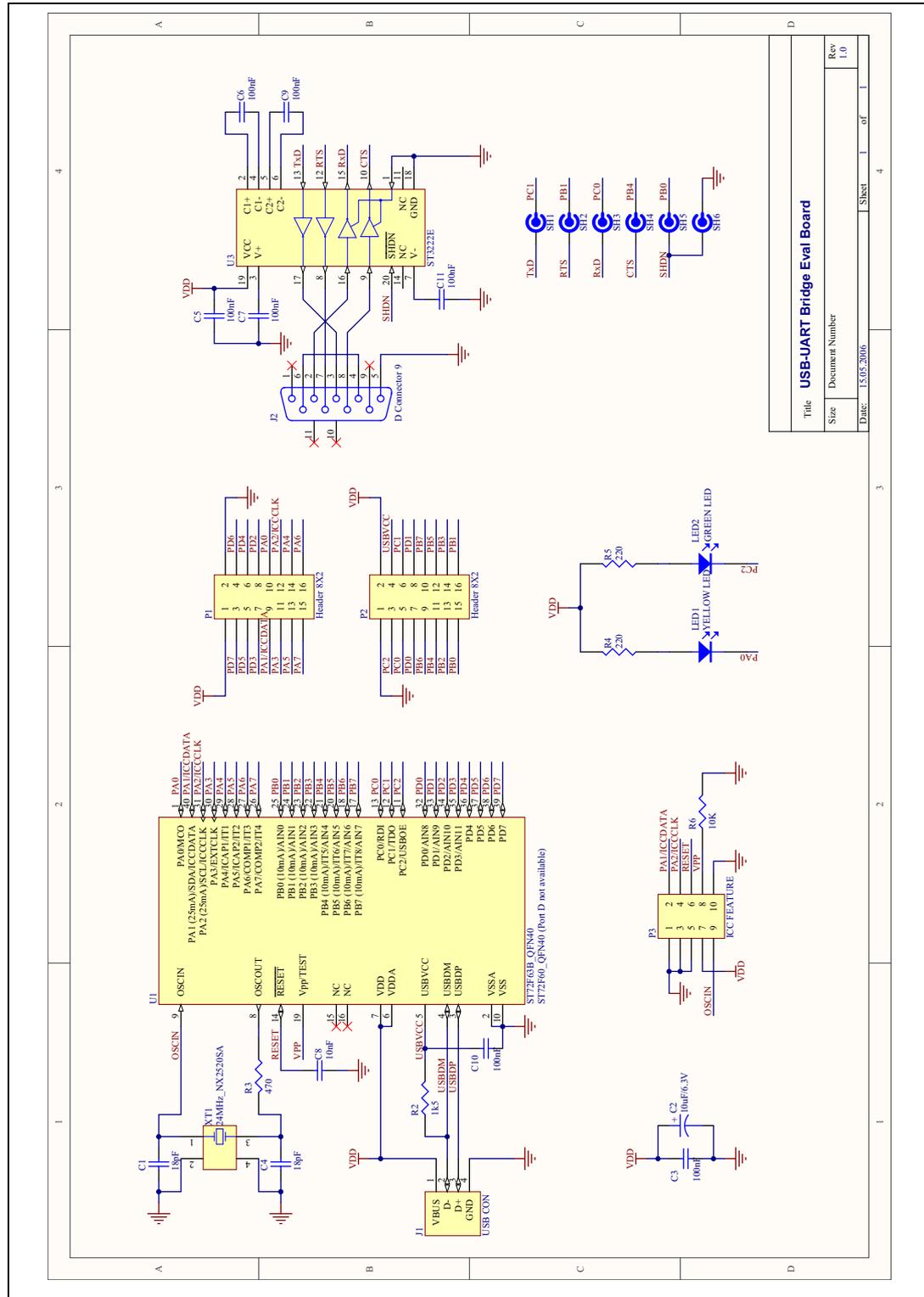
2.3 Adding extra circuitry on expansion connectors

The evaluation board features two 16-hole connectors (P1 & P2) with all the microcontroller I/O pins and which together with ICC connector (P3) are giving access to almost all MCU pins.

These connection points can be used for signal probing or adding extra circuitry needed to evaluate different applications. The figures in the next section give the definition of these points for each connector.

3 Low-speed USB/RS232 Evaluation Board diagram

Figure 6. Low-speed USB/RS232 Evaluation Board schematics



4 Revision history

Table 1. Document revision history

Date	Revision	Changes
03-Jul-2006	1	Initial release.

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