Future Technology Devices International Ltd.

Application Note AN_149

Upgrading a passive DB9 RS232 Interface to an active USB Interface using an FTDI DB9-USB-RS232 Module

This application note illustrates how to upgrade a passive RS232 interface to an active USB interface by replacing the RS232 DB9 connector with an FTDI DB9-USB-RS232 module

DB9-USB-RS232 is a USB to RS232 converter that can be fitted into a legacy RS232 DB9 connector PCB footprint with no change to the PCB.

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1 Introduction

The DB9-USB-RS232 connectors can be used to upgrade an RS232 port to an active USB port without the need to redesign the PCB. These active connectors contain all the USB to RS232 (and vice-versa) conversion electronics and are designed to fit directly into the same PCB footprint as a PC compatible RS232 DB9 connector.

The FTDI DB9-USB-RS232 connectors come in two types DB9-USB-RS232-M and DB9-USB-RS232-F.

A DB9-USB-RS232-M can be used to replace a male DB9 connector that is wired in a PC compatible RS232 manner.

A DB9-USB-RS232-F can be used to replace a female DB9 connector that is wired in a PC compatible RS232 manner.

Software drivers for the DB9-USB-RS232 connectors are available from the FTDI website.

1.1 Overview

This application note outlines the electrical wiring of a PC compatible male and female RS232 DB9 connector.

An example is also given showing how an RS232 DB9 connector can be replaced with an FTDI DB9-USB-RS232 module.

1.2 Background

In the long distant past, there was no standard defined for the connections on a DB9 connector when it was used as an RS232 interface. That changed when IBM introduced the PC-AT. This introduced a *generally accepted* DB9 RS232 standard and PC peripherals adopted the same pin-out using a 1-to-1 cable connection between the PC and the peripheral. The FTDI DB9-USB-RS232 have adopted this standard. The DB9 connector used is either male or female.

Note that **NOT ALL** peripheral adopted this standard so it is important for the user to check against the pin-out used for the male and female FTDI DB9-USB-RS232 connectors.

2 RS232 DB9 Wiring Conventions

DB9 connectors used for RS232 communication are either male or female type connectors.

The PC compatible accepted electrical connections for male and female RS232 DB9 connectors are illustrated in Figure 2.1 where the structure on the left is the top view of a male RS232 DB9 connector and the structure on the right is the top view of a Female RS232 DB9 connector.

Assuming a design follows these connection conventions, then an FTDI male or female DB9-RS232-USB connector can be used to replace this RS232 DB9 and turn the connection into an active USB interface.
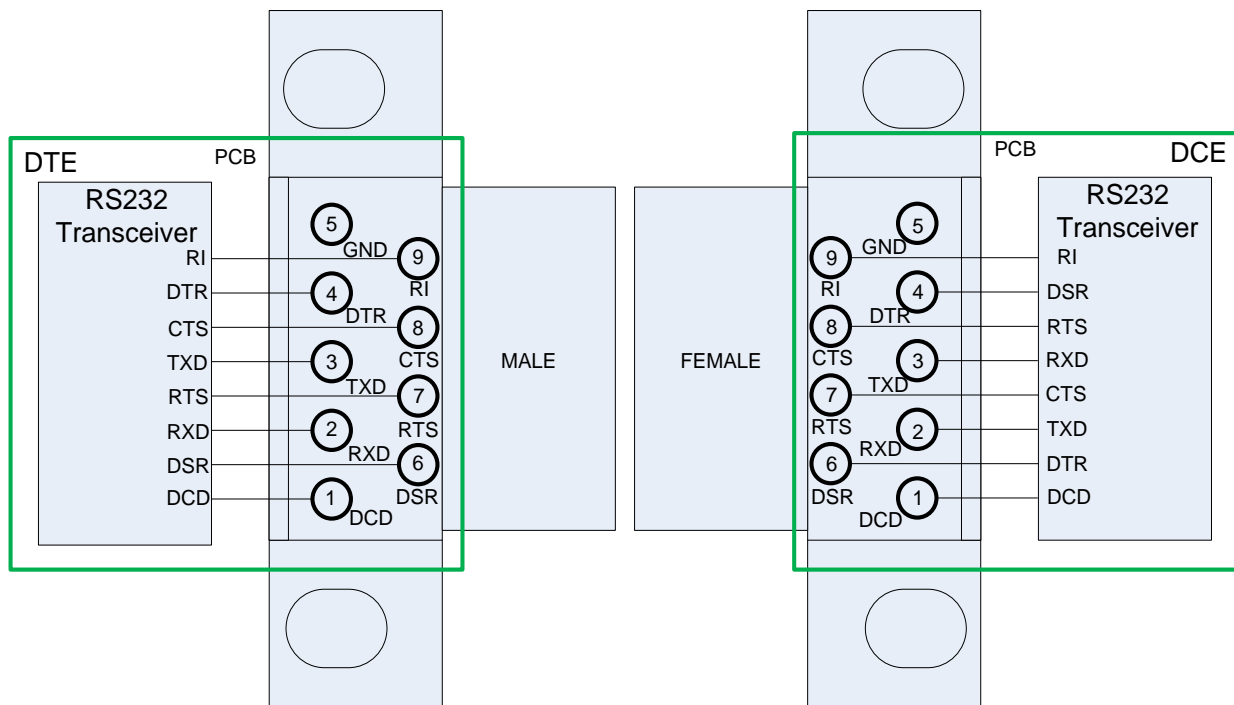
Figure 2.1 – Male and Female DB9-USB-RS232 PCB connections (top view looking through the module)

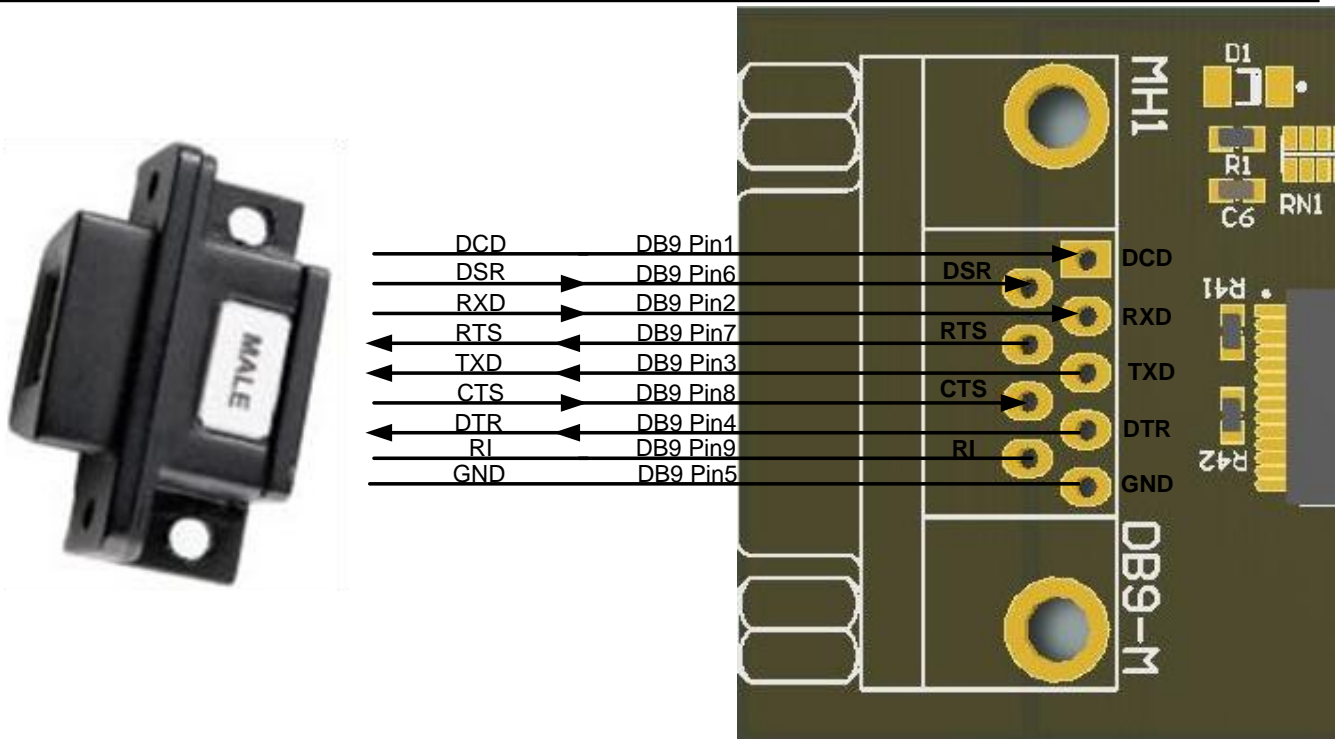Examples and signal directions are shown in Figure 2.2 and Figure 2.3

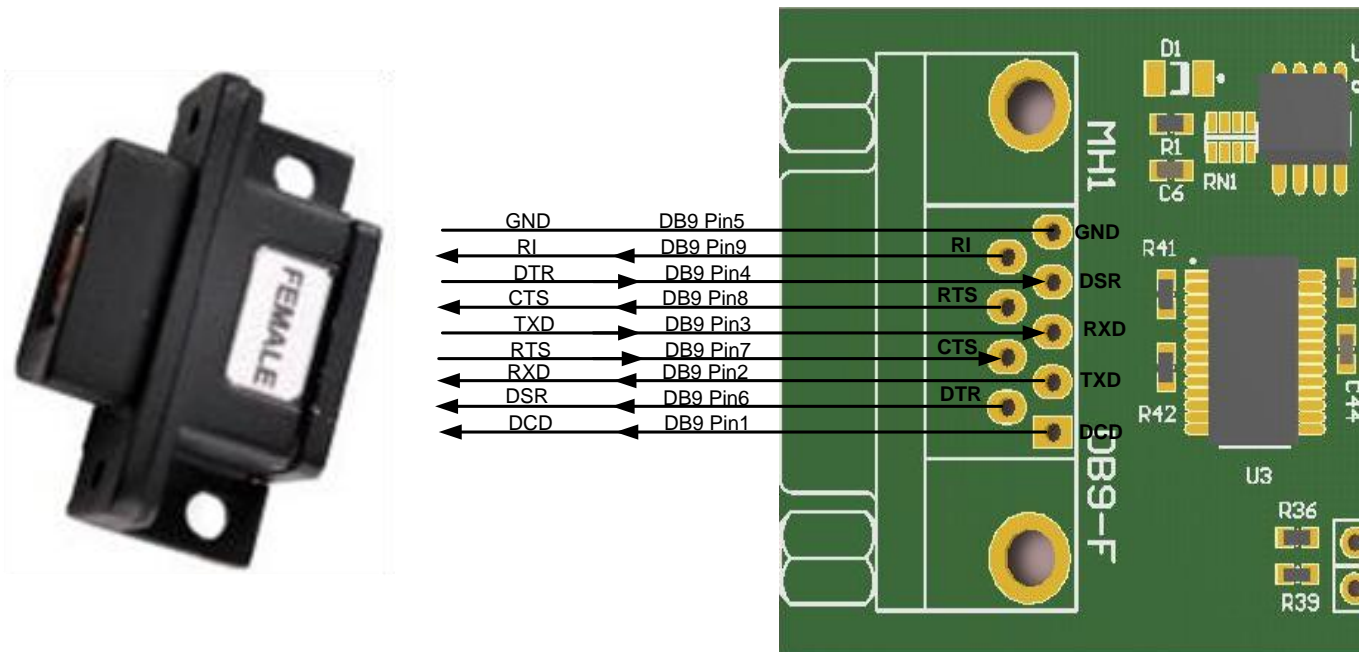**Figure 2.2 – DB9-USB-RS232-M Connection illustration**

Figure 2.3 – DB9-USB-RS232-F Connection illustration

3 Upgrading an RS232 DB9 Connector with a DB9-USB-RS232 USB Connector

To replace a passive RS232 DB9 connector with an active USB DB9-RS232-USB-M/F connector:

1: Remove the DB9 connector from the existing board.

2: Place and solder a suitable DB9-USB-RS232 into the DB9 footprint on the PCB.

To allow the new DB9-USB-RS232 connector to communicate with a PC, suitable USB FTDI drivers are required to be installed on the PC. These can be downloaded from the FTDI website. At http://ftdichip.com/

To verify that the DB9-USB-RS232 is communicating with the PC, an enumeration check can be carried out using a utility programme called "USB View". This is also available from the FTDI website.

An example of a DB9 RS232 connector being replaced by a DB9-USB-RS232 is shown in Fig. 1 and Fig. 2. Here the male DB9 of an FTDI EVAL232R shown in Fig. 1 is replaced by a DB9-USB-RS232-M Fig. 2.

This then allows the module to communicate with a PC through a USB interface without any PCB modification or any additional electronics. All the "intelligence" and electronics are contained within the DB9-USB-RS232-M

The example is not a practical example and is only provided as an illustration.

Fig. 1 – EVAL232R with a Male DB9

Fig. 2 – EVAL232R with a DB9-RS232-USB-M

4 Acronyms and Abbreviations

Terms	Description
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
TXD	Transmit Data (The transmit data line of RS232)
RXD	Receive Data (The receive data line of RS232)
GND	Ground

Table 4.1 Acronyms and Abbreviations

5   Contact Information

Head Office – Glasgow, UK

Future Technology Devices International Limited
Unit 1, 2 Seaward Place, Centurion Business Park
Glasgow G41 1HH
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales)	sales1@ftdichip.com
E-mail (Support)	support1@ftdichip.com
E-mail (General Enquiries)	admin1@ftdichip.com
Web Site URL	http://www.ftdichip.com
Web Shop URL	http://www.ftdichip.com

Branch Office – Taipei, Taiwan

Future Technology Devices International Limited (Taiwan)
2F, No. 516, Sec. 1, NeiHu Road
Taipei 114
Taiwan , R.O.C.
Tel: +886 (0) 2 8791 3570
Fax: +886 (0) 2 8791 3576

E-mail (Sales)	tw.sales1@ftdichip.com
E-mail (Support)	tw.support1@ftdichip.com
E-mail (General Enquiries)	tw.admin1@ftdichip.com
Web Site URL	http://www.ftdichip.com

Branch Office – Hillsboro, Oregon, USA

Future Technology Devices International Limited (USA)
7235 NW Evergreen Parkway, Suite 600
Hillsboro, OR 97123-5803
USA
Tel: +1 (503) 547 0988
Fax: +1 (503) 547 0987

E-Mail (Sales)	us.sales@ftdichip.com
E-Mail (Support)	us.support@ftdichip.com
E-Mail (General Enquiries)	us.admin@ftdichip.com
Web Site URL	http://www.ftdichip.com

Branch Office – Shanghai, China

Future Technology Devices International Limited (China)
Room 408, 317 Xianxia Road,
Shanghai, 200051
China
Tel: +86 21 62351596
Fax: +86 21 62351595

E-mail (Sales)	cn.sales@ftdichip.com
E-mail (Support)	cn.support@ftdichip.com
E-mail (General Enquiries)	cn.admin@ftdichip.com
Web Site URL	http://www.ftdichip.com

Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A – References

TIA Standard DB9 Connector **Reference**

http://www.interfacebus.com/RS232_Pinout.html

http://ftdichip.com/Support/Documents/DataSheets/Modules/DS_DB9-USB-RS232.pdf

Appendix B - Revision History

Revision History

Version 1.0   Initial Release   13th August 2010

Version 1.1   Simplified note.   12th October 2010