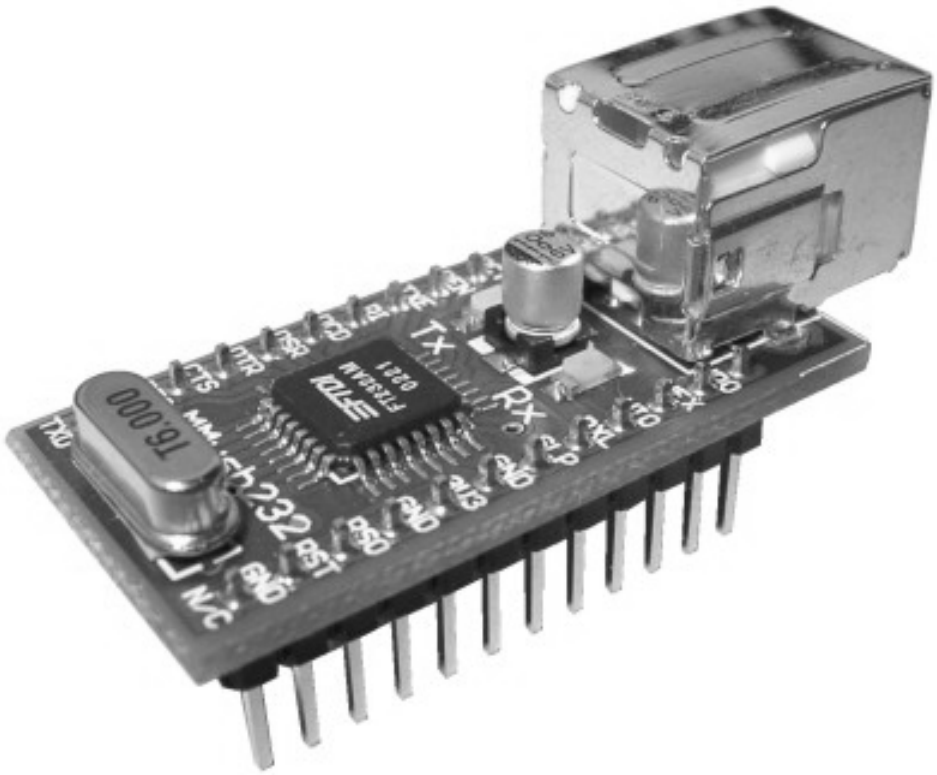


MMusb232

User's manual

Evalu ation Board s for '51, AVR, ST, PIC microcontrollers Starter Kits Embedded Web Servers Prototyping Boards Minimodules for microcontrollers, ethernet controllers, RFID High Speed In System programmers for AVR, PIC, ST microcontrollers Microprocesor systems, PCB designing Evaluation Boards for '51, AVR, ST, PIC microcontrollers Starter Kits Embedded Web Servers Prototyping Boards minimodules for microcontrollers, ethernet controllers, RFID High Speed In Systems programmers for AVR, PIC, ST microcontrollers Microprocesor systems, PCB designing Evaluation Boards for `51, AVR, ST, PIC microcontrollers Starter Kits Embedded Web Serwers Prototyping Boards Minimodules for microcontrollers, ethernet controllers, Speed In System programmers for AVR, PIC, ST microcontrollers Microprocesor systems, PCB Desig- ning Evaluation Boards

Many ideas one solution

REV 1.0

Introduction

MMusb232 is low-cost integrated module for data transmission via USB interface. It is based on FTDI`s FT232BM device. MMusb232 module can work with 1Mboud/s (RS232), 3Mboud/s (RS422/RS485, TTL) data transfer speed. It's simply device witch represents interface between USB and Asynchronous Serial Data Transfer. There is USB cable attached to module. Windows drivers allows emulate serial port on PC and that provides to upgrade applications. Choosing our Minimodule is the first step for projects, which should be done in the short time. MMusb232 could be used as part of prototype eliminating necessity of designing circuit board and final circuit in which module is fitted like "sandwich shape".

MMusb232 is made in two-layer printed circuit board technology with a solid ground plane. Module includes an integral 93C46 EEPROM on board which is programmable via USB. All signals are drive via 24 pin, 1.1 in wide footprint. Integral power control makes the MMusb232 a perfect choice for USB bus-powered, high power designs as well as self- and low-powered products.

We wish you were successful at designing and using new devices

Features Summary

- Single on-board Chip USB - Asynchronous Serial Data Transfer
- Full Handshaking & Modem Interface Signals
- UART I/F Supports 7 / 8 Bit Data, 1 / 2 Stop Bits and Odd/Even/Mark/Space/No Parity
- Data rate 300 => 3M Baud (TTL)
- Data rate 300 => 1M Baud (RS232)
- Data rate 300 => 3M Baud (RS422/RS485)
- 384 Byte Receive Buffer / 128 Byte Transmit Buffer for high data throughput
- Adjustable RX buffer timeout
- Fully Assisted Hardware or X-On / X-Off Handshaking
- In-built support for event characters and line break condition
- Auto Transmit Buffer control for RS485
- Support for USB Suspend / Resume through SLP and RI pins
- Support for high power USB Bus powered devices
- Integrated level converter on UART and control signals for interfacing to 5V and 3.3V logic
- Integrated 3.3V regulator for USB IO
- Integrated Power-On-Reset circuit
- 6MHZ resonator
- Integrated 6MHz – 48Mhz clock multiplier PLL
- USB Bulk or Isochronous data transfer modes
- 4.35V to 5.25V single supply operation
- UHCI / OHCI / EHCI host controller compatible
- USB 1.1 and USB 2.0 compatible
- USB VID, PID, Serial Number and Product Description strings in external EEPROM
- EEPROM programmable on-board via USB

- Standard USB connector, B type
- Two LEDs (RX, Tx)

Virtual Com Port (VCP) drivers

- Windows 98/ 98 SE / 2000 / ME / XP, MacOS, Linux 2.4 and greater

D2XX (Direct Drivers + DLL S/W)

- Windows 98 / 98 SE / 2000 / ME / XP, Linux

Application Areas

- USB to RS232, RS422/RS485 converters
- Upgrading RS232 Legacy Peripherals to USB
- Cellular and Cordless Phone USB data transfer
- cables and interfaces
- Interfacing MCU based designs to USB
- USB Audio and Low Bandwidth Video data transfer
- PDA - USB data transfer
- USB Smart Card Readers
- Set Top Box (S.T.B) PC - USB interface
- USB Hardware Modems
- USB Wireless Modems
- USB Instrumentation
- USB Bar Code Readers

General Description

MMusb232 module is a USB interface that incorporates the functionality FT232BM into a single 24-pin module. A single USB port is converted to RS232 or RS422/RS485 interface, which allows communicating with greater speed..

By using FTDI's virtual COM port drivers, the peripheral looks like a standard COM port to the application software. Commands to set the baud rate are ignored - the device always transfers data at its fastest rate regardless of the application's baud-rate setting. Alternatively, FTDI's D2XX drivers allow application software to access the device "directly" through a published DLL based API.

MMusb232 Module Simplified Block Diagram

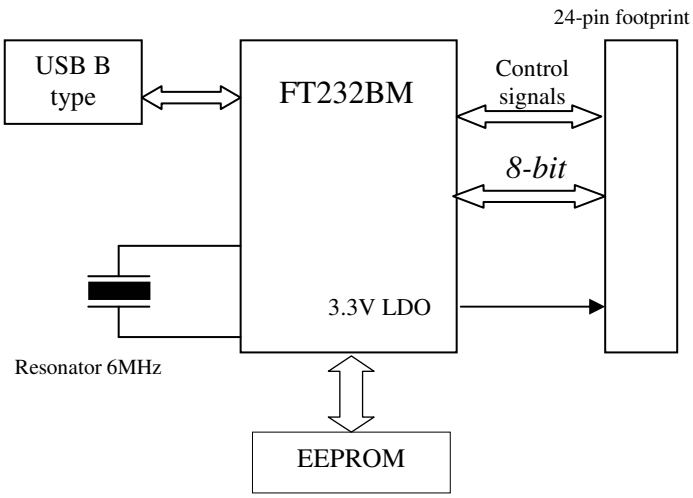


***Figure 1. MMusb232** block diagram*

Functional Block Descriptions

6MHz Oscillator

The 6MHz Oscillator cell generates a 6MHz reference clock input to the x8 Clock multiplier from an external 6MHz ceramic resonator.

Controller includes:

- Integrated Power-On-Reset
- Integrated Level Converter on UART interface and control signals
- Improved Power Management control for USB Bus Powered, high current devices
- Lower Suspend Current
- Support for USB Isochronous Transfers
- Programmable Receive Buffer Timeout
- Improved PreScaler Granularity
- Bit Bang Mode
- Extended EEPROM Support
- USB 2.0 (full speed option)
- Multiple Device Support without EEPROM
- 3.3V LDO Regulator
- USB Transceiver
- USB DPLL
- x8 Clock Multiplier
- Serial Interface Engine (SIE)
- USB Protocol Engine
- Dual Port TX Buffer (128 bytes)
- Dual Port RX Buffer (384 bytes)
- UART FIFO Controller
- UART
- Baud Rate Generator
- RESET Generator
- EEPROM Interface

(More info: www.ftdichip.com)

EEPROM memory
The on-board 93C46 EEPROM allows customize the USB VID, PID, Serial Number, Product Description Strings and Power Descriptor value of the MMusb232 for OEM applications. Other parameters controlled by the EEPROM include Remote Wake Up, Isochronous Transfer Mode. The EEPROM is programmable in-circuit via USB using a utility program available from FTDI's web site (www.ftdichip.com) and www.propox.com

Module Pin-Out

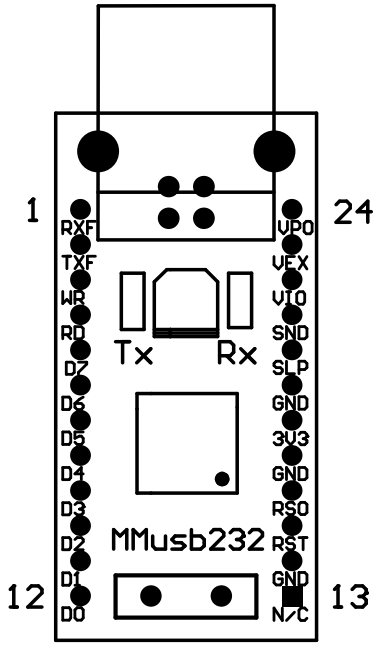


Figure 2. Pin-Out

Pin Definitions

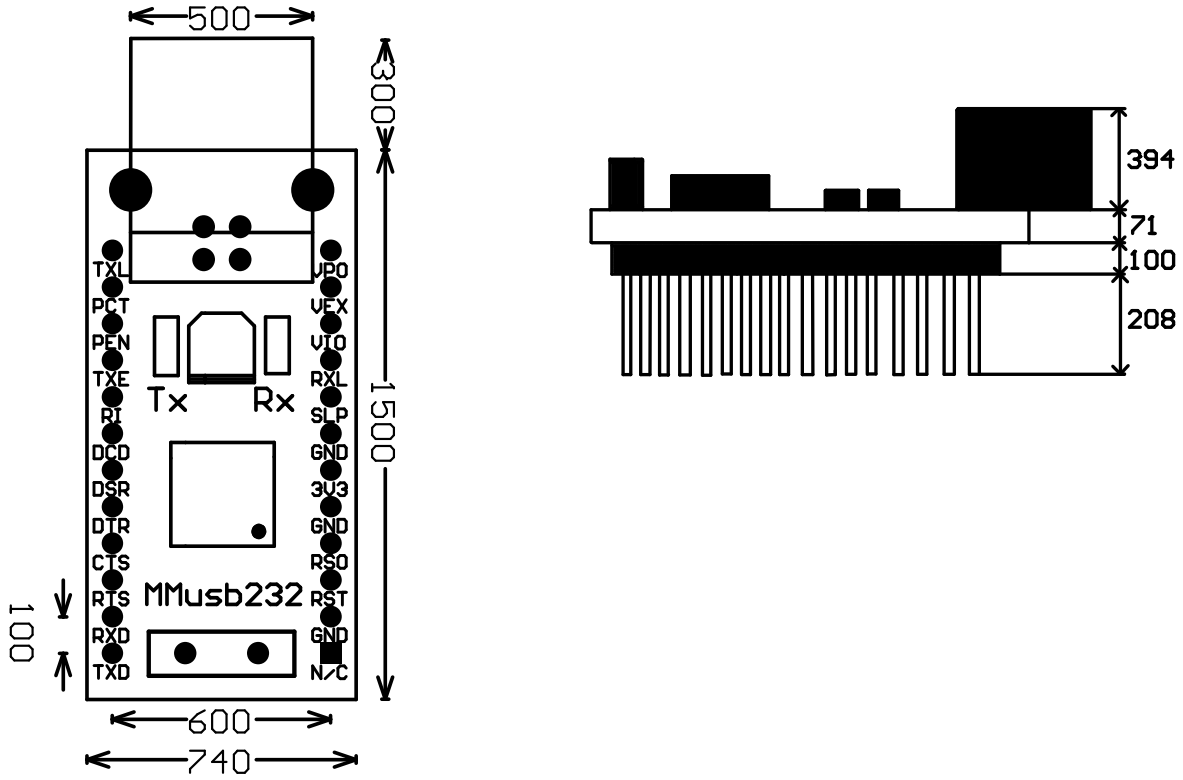
Pin	Pin's name	mode	Description
1	TXL	output (O.C.)	LED Drive - Pulses Low when Transmitting Data via USB
2	PCT	input	Bus Powered – Tie Low / Self Powered – Tie High
3	PEN	output	Goes Low after the device is configured via USB, then high during USB suspend. Can be used to control power to external logic using a P-Channel Logic Level MOSFET switch. Enable the Interface Pull-Down Option in EEPROM when using the PEN pin in this way.
4	TXE	output	Enable Transmit Data for RS485
5	RI	input	Ring Indicator Control Input. When the Remote Wakeup option is enabled in the EEPROM, taking RI low can be used to resume the PC USB Host controller from suspend.
6	DCD	input	Data Carrier Detect Control Input
7	DSR	input	Data Set Ready Control Input / Handshake signal
8	DTR	input	Data Terminal Ready Control Output / Handshake signal
9	CTS	input	Clear To Send Control Input / Handshake signal
10	RTS	output	Request To Send Control Output / Handshake signal
11	RXD	input	Receive Asynchronous Data Input
12	TXD	output	Transmit Asynchronous Data Output
15	RST	input	Can be used by an external device to reset the MMusb232. If not required, tie to VCC.

16	RSO	output	Output of the internal Reset Generator. Stays high impedance for ~ 5ms after VCC > 3.5V and the internal clock starts up, then clamps its output to the 3.3v output of the internal regulator. Taking RESET# low will also force RSTOUT# to drive low. RSTOUT# is NOT affected by a USB Bus Reset.
18	3V3	output	3.3 volt Output from the integrated L.D.O. regulator.
20	SLP	output	Goes Low during USB Suspend Mode. Typically used to power-down an external TTL to RS232 level converter i.c. in USB <=> RS232 converter designs.
21	RXL	Output (O.C.)	LED Drive - Pulses Low when Receiving Data via USB
22	VIO	input	+3.0 volt to +5.25 volt VCC to the UART interface pins
23	VEX	input	Set main power supply, should be connect to VPO if powered from USB port
24	VPO	output	Power supply from USB

Technical Data

Dimensions : 45mm x 20mm x 15mm
Weight : ~ 60 g
Power supply : 5V

Mechanical Dimensions



Dimensions are in miles.
1miles – 1/1000 inch
100miles = 2,54mm

Standard Device Configuration Examples

USB Bus Powered and Self Powered Configuration

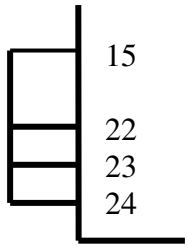


Figure 3a. USB Bus Powered

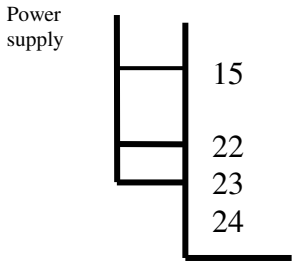


Figure 3b. External Powered

Figure 3a illustrates a typical USB bus powered configuration. A USB Bus Powered device gets its power from the USB bus. Basic rules for USB Bus power devices are as follows:

a) On plug-in, the device must draw no more than 100mA
b) On USB Suspend the device must draw no more than 500uA.
    a) A High Power USB Bus Powered Device (one that draws more than 100mA) should use the on-board MOSFET to keep the current drawn by external circuitry to below
c) ~70mA on plug-in and ~200uA on USB suspend
d) A device that consumes more than 100mA can not be plugged into a USB
e) No device can draw more that 500mA from the USB Bus.
f) No device can draw more that 500mA from the USB Bus. The power descriptor in the EEPROM should be programmed to match the current draw required by the device. A Ferrite Bead is connected in series with USB power to prevent noise from the device and associated circuitry (EMI) being radiated down the USB cable to the host.

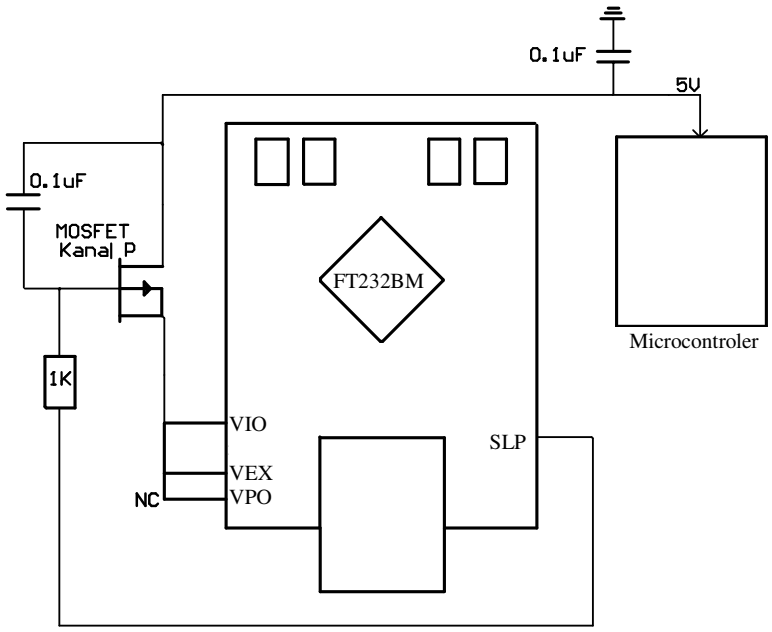
Figure 3b illustrates a typical USB self powered configuration. A USB Self Powered device gets its power from its own Power Supply and does not draw current from the USB bus. Basic rules for USB Self power devices are as follows:

a) A Self-Powered device should not force current down the USB bus when the USB Host or Hub Controller is powered down.
b) A Self-Powered device can take as much current as it likes during normal operation and USB suspend as it has its own power source.
c) A Self-Powered device can be used with any USB Host and both Bus and Self Powered USB Hubs.

The USB power descriptor option in the EEPROM should be programmed to a value of zero (self powered).

If interface between MMusb232 and device must be 3.3v logic level, then 22 pin, should be connected to +3.3V voltage.

Bus powered circuit with power control – 5V power supply



Technical support

If You have problem with MMusb232, please contact us at support@propox.com.

Schematic

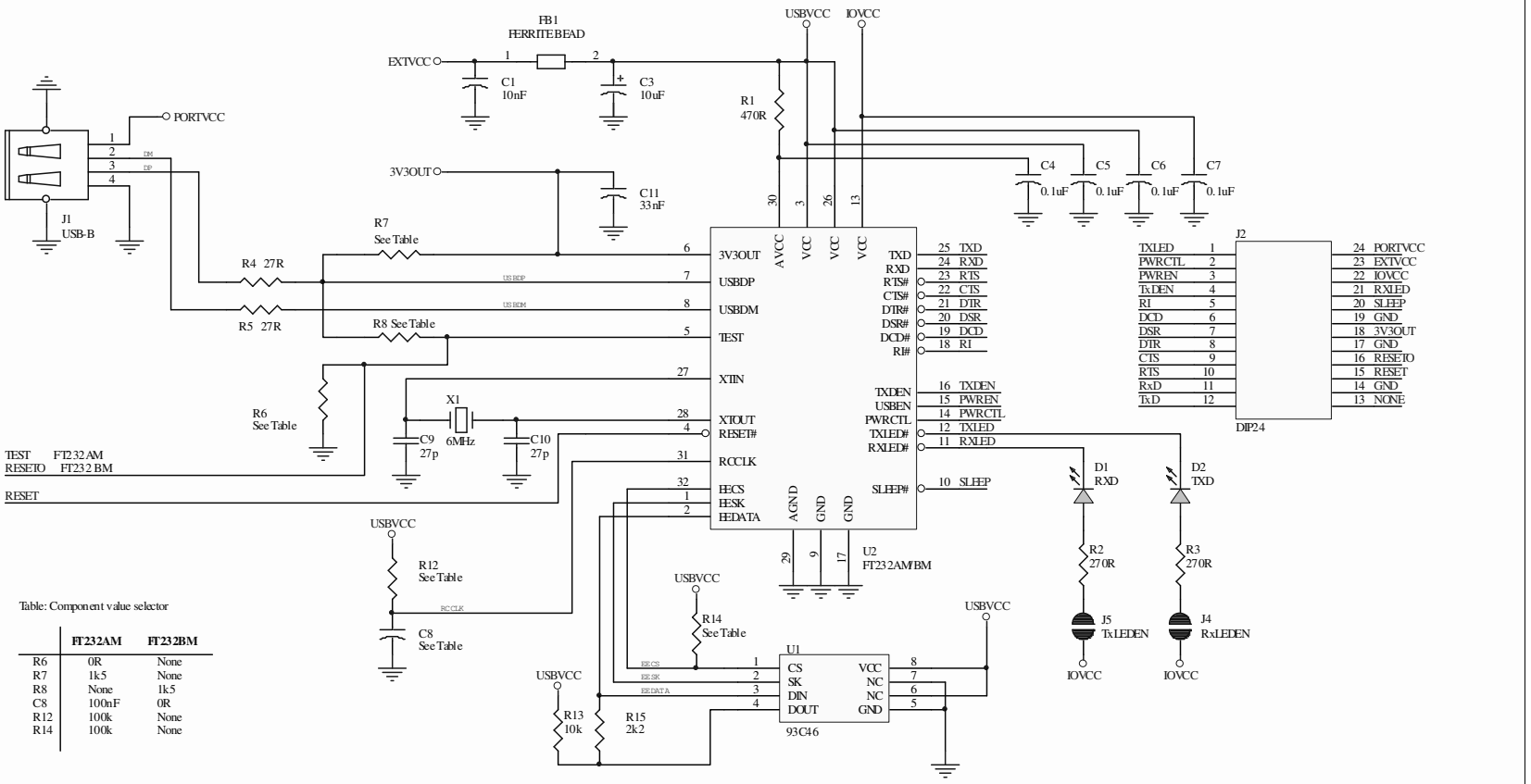


Table: Component value selector

	FT232AM	FT232BM
R6	0R	None
R7	1k5	None
R8	None	1k5
C8	100nF	0R
R12	100k	None
R14	100k	None

PROPOX® Many ideas one solution	http://www.propox.com email: support@propox.com	
Title: USB - SERIAL UART Interface Module		
Size:	File:	Rev:
	Date: 20-10-2002	Sheet 1 of 1	1.00