

EVBstr71xF

Evaluation Board for MMstr71xF minimodule

User Manual

REV 0.8

PROPOX®
Many ideas one solution

Contents

1 INTRODUCTION	3
FEATURES	3
2 THE BOARD.....	4
PLACEMENT OF ELEMENTS ON THE BOARD	4
ARRANGEMENT OF LEAD-OUTS	5
BOARD CONFIGURATION	5
BOARD SUPPLY	7
LED DIODES.....	7
PUSH-BUTTONS.....	8
LCD DISPLAY	8
POTENTIOMETERS.....	9
BUZZER	9
RESET BUTTON	10
RS-232 INTERFACES	10
USB INTERFACE	11
1-WIRE INTERFACE	12
JTAG CONNECTOR	12
3 TECHNICAL ASSISTANCE	13
4 GUARANTEE	13
5 BOARD LAYOUT AND DIMENSIONS.....	14
6 SCHEMATIC.....	14

Introduction

The EVBstr71xF board was created with the aim of providing a hardware base for a designer of systems relying on the MMstr71xF minimodule, allowing to realize and verify quickly one's own ideas. Having this in mind, the board has been designed in such a way that the user has access to all terminals of the module which are led out to connectors. The board houses also such peripherals as: LEDs, push-buttons, potentiometers, a LCD display, a RS232 interfaces, and a 1-Wire connector. All these elements are accessible through pin connectors, permitting their connection with any processor port. The board has also a large prototype area which permits the designer to connect other elements in any configuration. Due to the incision (v-cut) between the prototype area and the rest of the board, the prototype part can be broken off. The board contains also a power supply which relieves the user from the need to provide a regulated supply voltage. Together with the board, we deliver GCC compiler as well as demonstration software. The EVBstr71xF along with the MMstr71xF minimodule can be also used in didactic laboratories of informatics colleges and universities. It can be also used to build circuits realizing thesis projects.

We wish you nothing but success and a lot of satisfaction in designing and developing new electronic equipment based on the EVBstr71xF board and the MMstr71xF minimodule.

Features

- Socket for the MMstr71xF module
- Connector with all terminals of the MMstr71xF module
- Connectors of all peripherals accessible on board
- Power supply
- Power switch
- USB connector
- Two RS232 ports
- 1-Wire connector
- JTAG connector for in system programming and debugging
- connector for 2x16 LCD display
- 8 LED diodes
- 4 push-buttons
- 2 potentiometers
- Buzzer
- Prototype design area

2 The Board

Placement of elements on the board

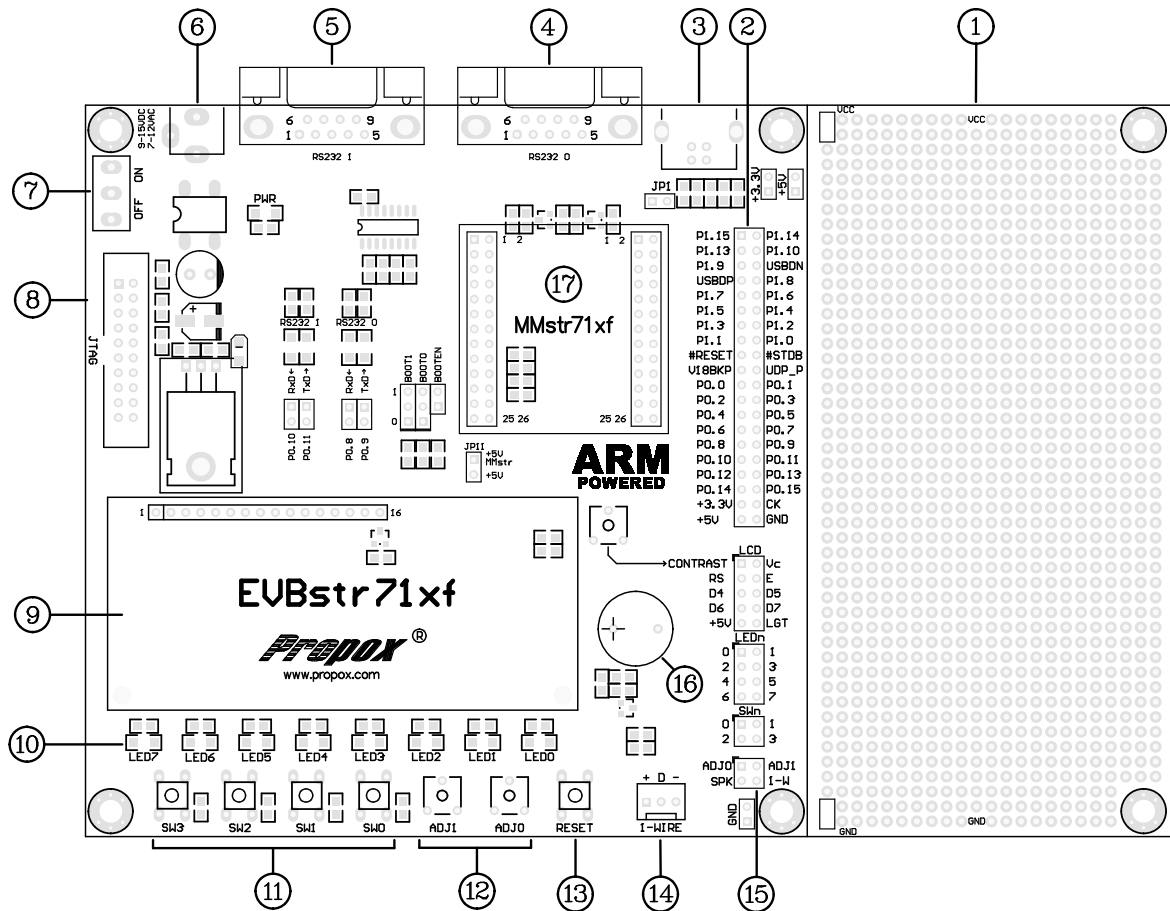


Figure 1 Placement of elements on the EVBstr71xF board.

1. Prototype area
2. Connector with led-out MMstr71xF module terminals
3. USB connector
4. RS232 0 connector
5. RS232 1 connector
6. Supply connector
7. Power switch
8. JTAG connector for in system programming/debugging
9. LCD display
10. LED diodes
11. Push-buttons
12. Potentiometers
13. RESET button
14. 1-Wire connector
15. Peripheral connectors
16. Buzzer
17. MMstr71xF module

Arrangement of lead-outs

Function in MMstr71xF	Name		Name	Function in MMstr71xF	
	P1.15	1	2	P1.14	
	P1.13	3	4	P1.10	
	P1.9	5	6	USBDN	
	USBDP	7	8	P1.8	
	P1.7	9	10	P1.6	
	P1.5	11	12	P1.4	
	P1.3	13	14	P1.2	
	P1.1	15	16	P1.0	
	#RESET	17	18	#STDBY	
	V18BKP	19	20	UDP_P	
	P0.0	21	22	P0.1	
	P0.2	23	24	P0.3	
DataFlash – MISO	P0.4	25	26	P0.5	DataFlash - MOSI
DataFlash – SCK	P0.6	27	28	P0.7	DataFlash – #CS
	P0.8	29	30	P0.9	
	P0.10	31	31	P0.11	
	P0.12	33	34	P0.13	
	P0.14	35	36	P0.15	
	+3.3V	37	38	CK	
	+5V	39	40	GND	

Board configuration

EVBstr71xF board has nine configuration jumpers. Correct jumper settings are necessary for proper board operation. Placement of jumpers on the board and their description is shown below.

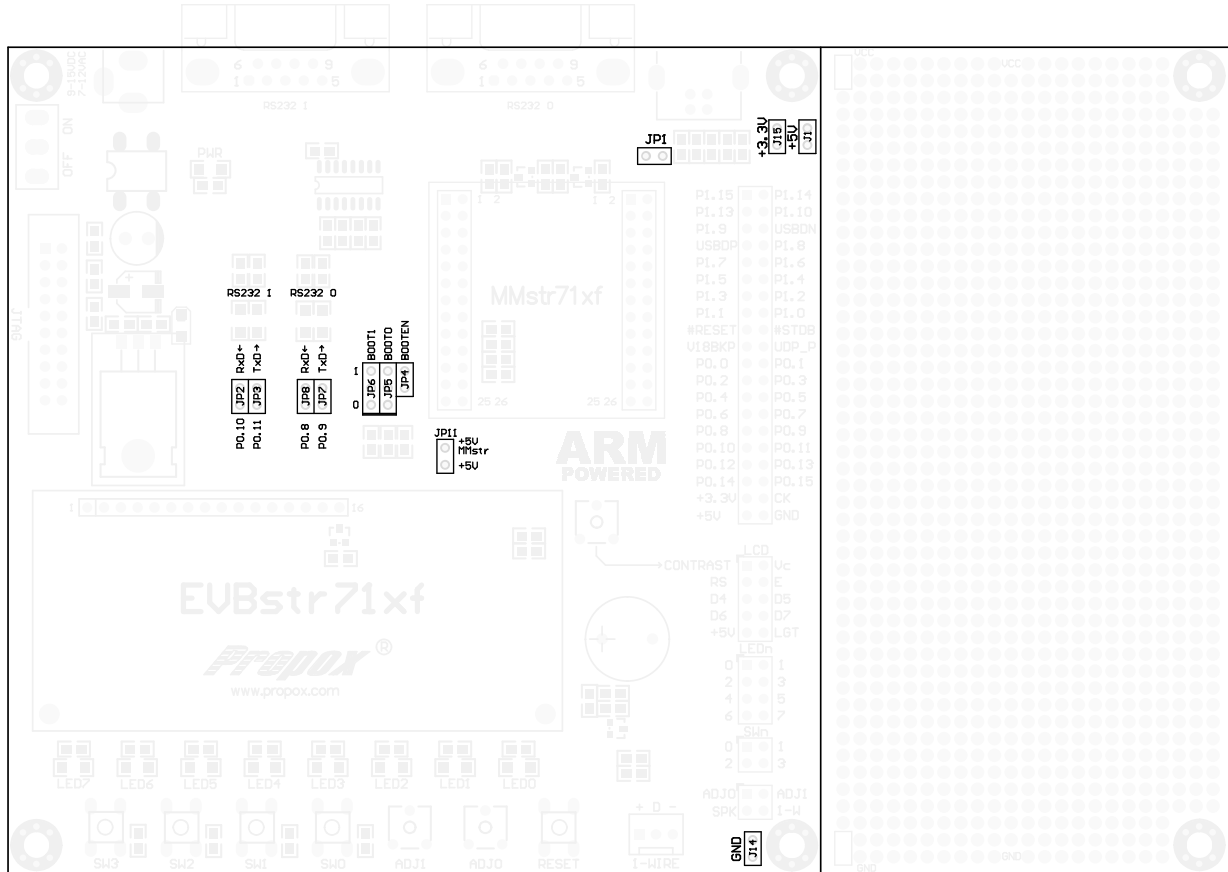


Figure 2 Placement of configuration jumpers.

Jumpers description:

No.	Default setting	Description																								
JP11	Closed	+5V supply voltage for MMstr71xF minimodule. This jumper allows measurement of current drawn by minimodule. During normal operation this jumper should be closed.																								
JP1	Opened	Board +5V power supply from USB bus. More detail sin “USB interfaced section”.																								
JP2 JP3	Opened Opened	Jumpers connecting RxD (JP2) and TxD (JP3) lines of RS232 1 transceiver with microcontrollers P0.10 and P0.11 lines (UART1 port).																								
JP8 JP7	Closed Closed	Jumpers connecting RxD (JP8) and TxD (JP7) lines of RS232 0 transceiver with microcontrollers P0.8 and P0.9 lines (UART0 port).																								
JP4 JP5 JP6	Opened "0" "0"	<p>Boot mode configuration jumpers:</p> <table border="1"> <thead> <tr> <th>BOOTEN</th> <th>BOOT1</th> <th>BOOT0</th> <th>Boot mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>x</td> <td>x</td> <td>Internal Flash</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>Reserved</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>Internal RAM</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>Internal RAM</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>External memory (only STR710)</td> </tr> </tbody> </table>	BOOTEN	BOOT1	BOOT0	Boot mode	0	x	x	Internal Flash	1	0	0	Reserved	1	1	0	Internal RAM	1	0	1	Internal RAM	1	1	1	External memory (only STR710)
BOOTEN	BOOT1	BOOT0	Boot mode																							
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1	1	1	External memory (only STR710)																							
J1		+5V supply voltage for external use.																								
J15		+3.3V supply voltage for external use.																								
J14		Ground.																								

Board supply

The EVBstr71xF board can be supplied in two ways:

- From an external power supply with an output of 7-12 V AC or 9-15 V DC, having a standard plug with a bolt diameter of 2.1 mm, connected to supply socket J3. In case of a DC supply voltage its polarity is irrelevant.
- From USB connector. In this case JP1 jumper should be closed.

Regulated +5V and +3.3V voltages are led to J1 (+5V) and J15 (+3.3V) connectors, ground to J14.

Caution: Both supply methods should not be used simultaneously!

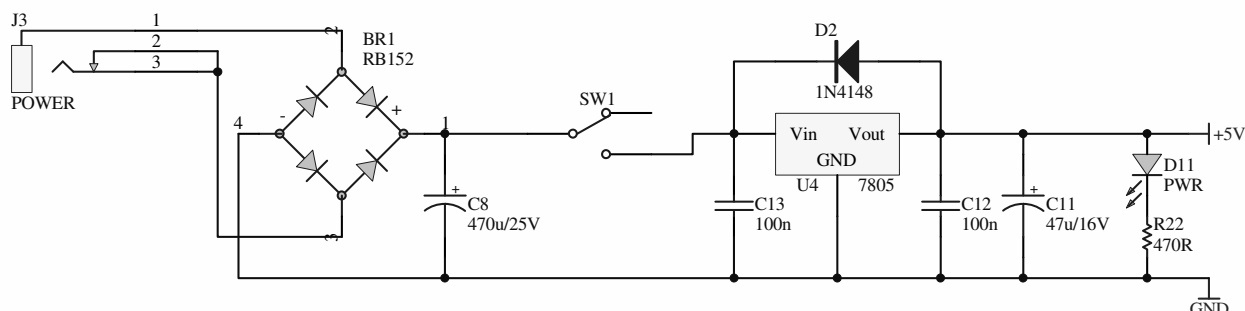


Figure 3 Implementation of the power supply on the EVBstr71xF board.

Solution with JP1 jumper allows drawing up to 100mA from USB bus. To draw higher current (up to 500mA), accordingly to USB 1.1 or 2.0 specifications, power switch should be used. Software should turn on this power switch after successful enumeration. Example of power switch is shown below (it is not implemented on the board).

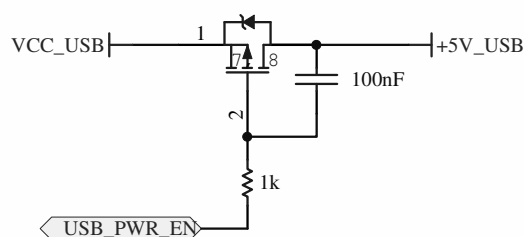


Figure 4 Optional USB power switch.

LED diodes

The EVBstr71xF has 8 LED diodes which play the role of the simplest interface between the system and the user. The board is constructed in such a way that it allows any connection between the diodes and microcontroller leads. A diode lights up when a low signal level is applied to appropriate leads. The LED current flowing into the microcontroller pin is about 3.5mA.

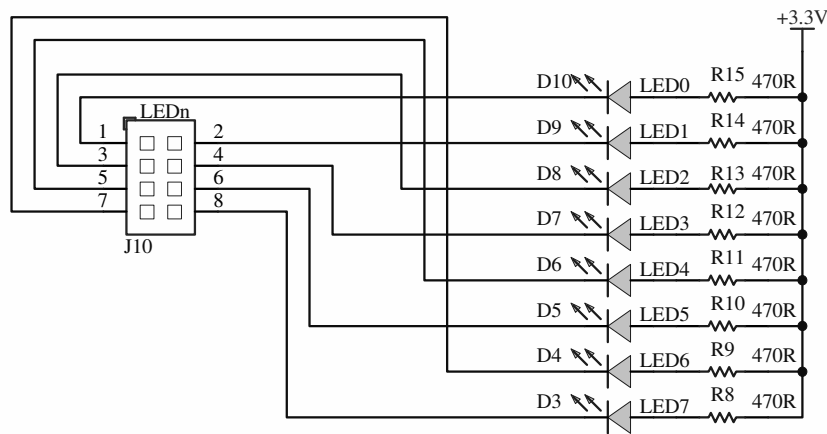


Figure 5 Implementation of LED diodes.

Push-buttons

The EVBstr71xF board is equipped with four microswitches which can be connected to any lead of the microcontroller. Pushing a button causes a low state on any port terminal.

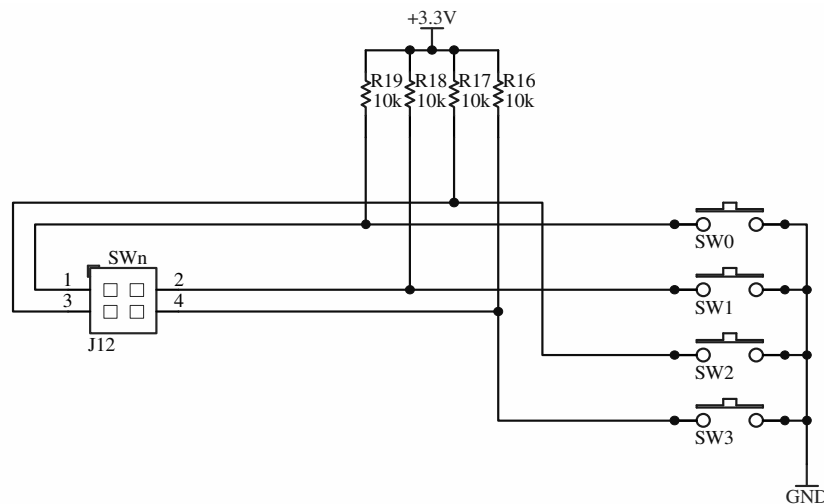


Figure 6 Implementation of push-buttons.

LCD display

MMstr71xF has place for standard 2x16 characters LCD display with HD44780 compatible controller. Display terminals D4-D7, RS, E, contrast and backlight are led to LCD connector J7. LCD connector is designed in this way, that it is possible to connect contrast signal to onboard potentiometer with use of jumpers, or with use of wire to any microcontroller pin, that can generate PWM (through RC low pass filter, which can be built on prototype area). Similarly, LCD backlight can be permanently turned on by closing jumper, or can be controlled by any microcontroller pin.

Because LCD connector contains only higher part of display bus, it has to work 4-bit mode. Also, RW line is permanently connected to ground, what allows only read operation, but it is sufficient to proper operation. Such approach minimizes required microcontroller port pins to six.

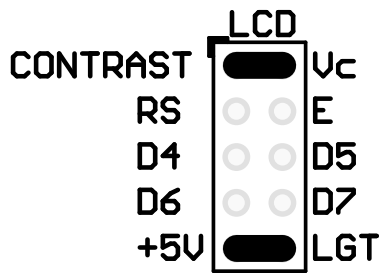


Figure 7 Default LCD configuration – backlight permanently turned on, contrast regulated with R5 potentiometer.

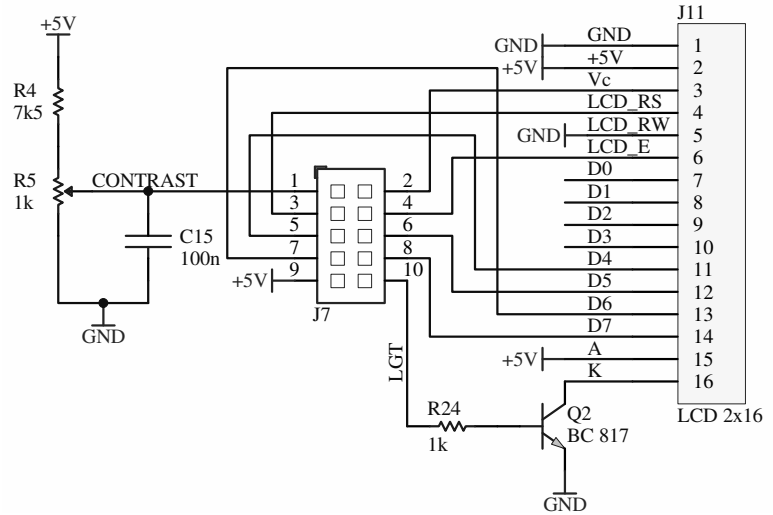


Figure 8 Connection of LCD display on the board.

Potentiometers

EVBstr71xF has two potentiometers, POT0 and POT1. The potentiometers can be used to simulate the outputs of analog circuits. The voltage across POTx terminals can be adjusted in the 0...3.3V range.

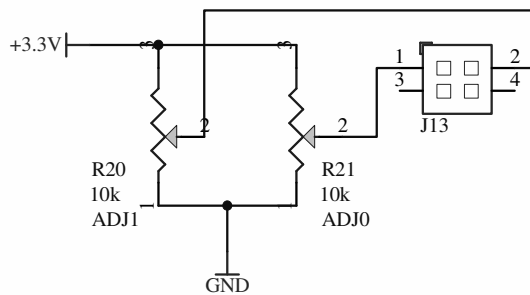


Figure 9 Implementation of potentiometers.

Buzzer

The board has a built-in acoustic signaler, controlled by a logic low state through a transistor. The base of the transistor is connected to connector J13 as SPK.

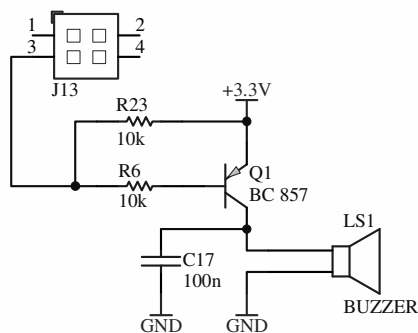


Figure 10 Implementation of the Buzzer.

RESET button

The EVBstr71xF board is equipped with an on-board resetting button; by pressing it we force a low state on the RESET terminal of the module.

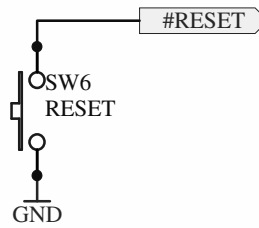


Figure 11 Implementation of the RESET push-button.

RS-232 interfaces

EVBstr71xF has two RS232 ports with DB-9 connector. Tx/D and Rx/D lines are led to jumpers through MAX3232 transceiver.

Stuffing jumpers causes connection of Tx/D and Rx/D signals to microcontrollers UART0 or UART1 ports. RS232 signals can also be connected to microcontrollers remaining two UART ports with use of wires. Drawing below shows implementation of RS232 ports and RS232 0 port connected to microcontrollers P0.8 and P0.9 pins (UART0).

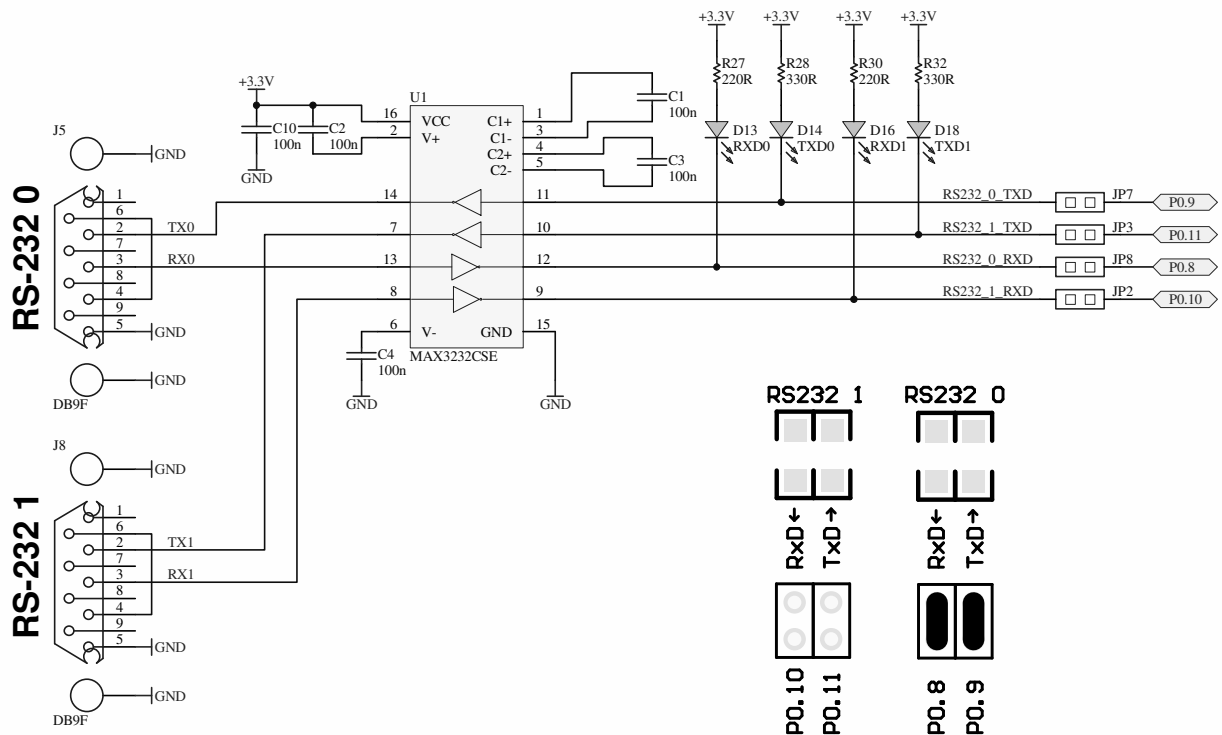


Figure 12 Connection of RS-232 ports to MMstr71xF.

USB interface

Board is equipped with USB interface connector. USB allows connection with PC or other USB host and transfer data with up to 1MB/s speed. Along with USB connector there are RC filtering circuits and jumper for connecting USB bus power with board +5V voltage.

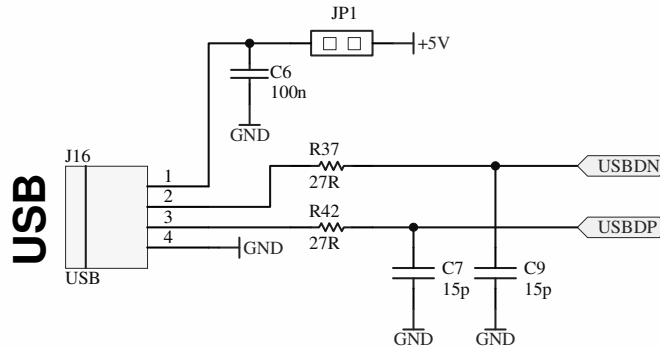


Figure 13 USB connector.

Solution with JP1 jumper allows drawing up to 100mA from USB bus. To draw higher current (up to 500mA), accordingly to USB 1.1 or 2.0 specifications, power switch should be used. Software should turn on this power switch after successful enumeration. Example of power switch is shown below (it is not implemented on the board).

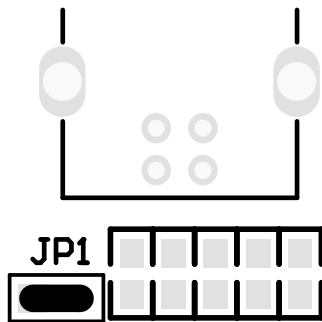


Figure 14 Jumper connecting USB bus power with board +5V voltage (JP1).

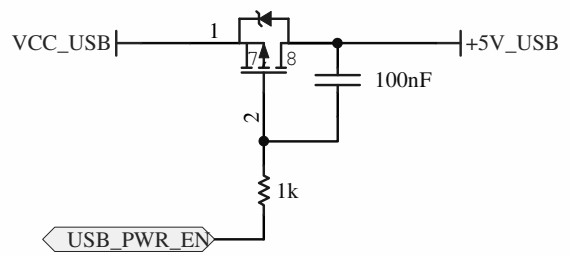


Figure 15 Example of USB power switch – it is necessary for drawing more than 100mA from USB bus.

USB host recognize presence of device on the bus by sensing pull-up on D+ line. MMstr71xF has built-in pull-up circuit, shown on drawing below.

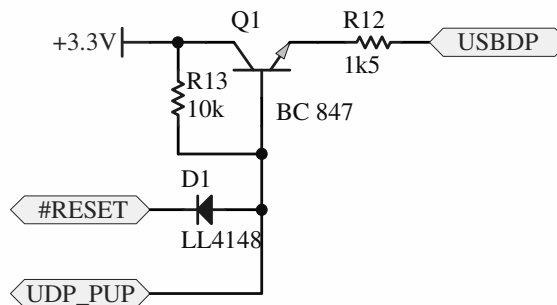


Figure 16 Implementation of D+ pull-up circuit on MMstr71xF.

Pull-up is by default turned on by R13 resistor. Active reset signal or low level on UDP_PUP line turns off pull-up, what is interpreted by USB host as disconnection of USB device.

1-Wire interface

The EVBstr71xF board has a 1-Wire bus connector. This connector can be used to connect e.g. a digital DS1820 thermometer or Dallas/Maxim iButton reader from. The data signal has been applied to the J13 connector and designated as 1-W. It can be connected to any microcontroller lead-out by means of the attached cable.

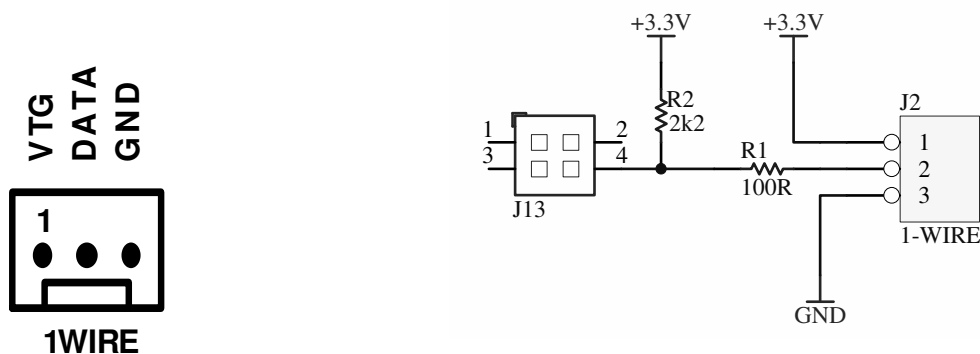


Figure 17 Connection of the 1-Wire connector.

JTAG connector

Programming/debugging of module can be done through JTAG interface.

JTAG is a four-lead interface permitting the takeover of control over the processor's core. The possibilities offered by this interface are, among others: step operation, full-speed operation, hardware and software breakpoints, inspection and modification of contents of registers and data memories.

EVBstr71xF board has standard, 20-pin connector, allowing operation with all JTAG debuggers.

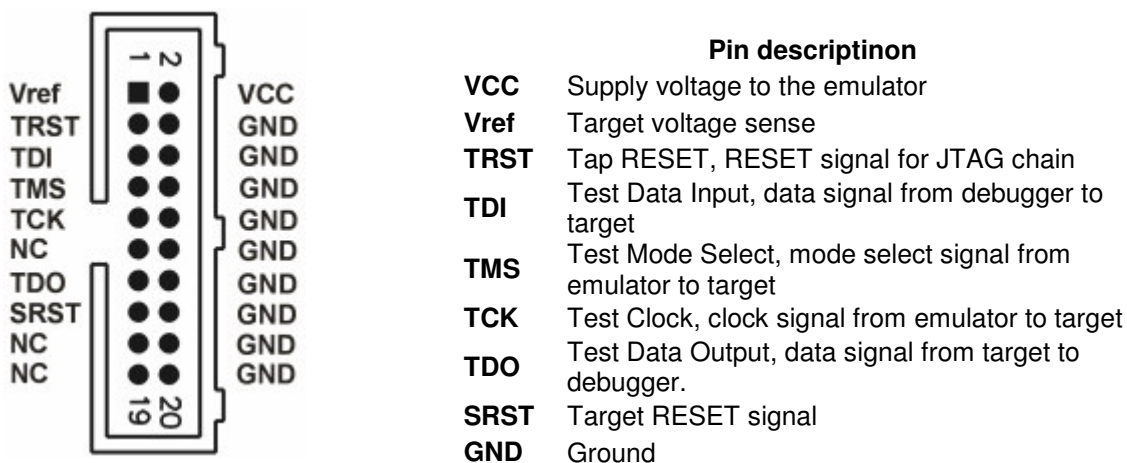


Figure 18 JTAG connector.

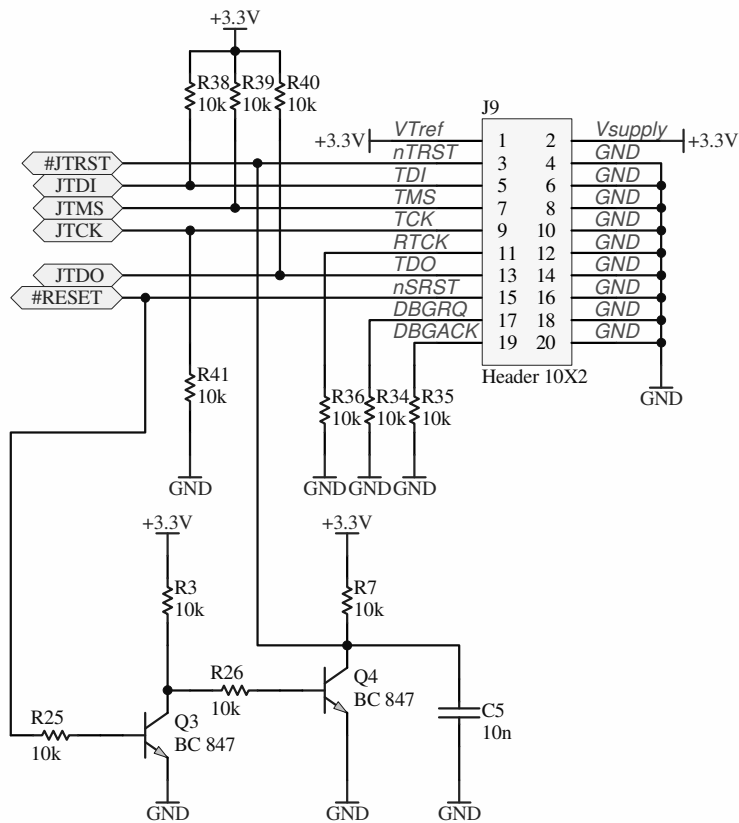


Figure 19 Connection of JTAG socket on EVBstr71xF.

JTAG programmer/debugger may be found on page:

- ARMCable I: http://www.propox.com/products/t_122.html

3 Technical assistance

In order to obtain technical assistance please contact support@propox.com . In the request please include the following information:

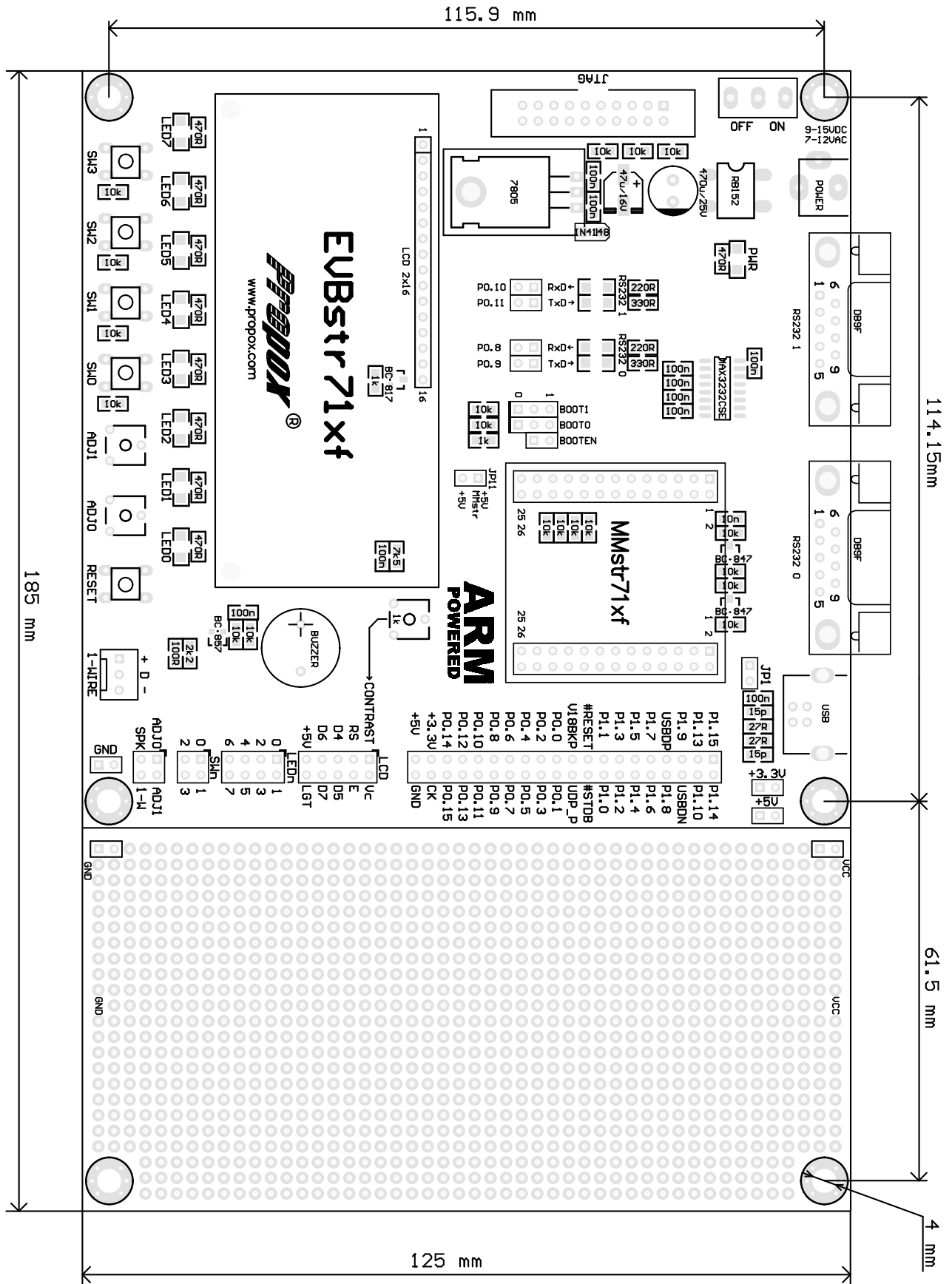
- Number of the board version (e.g. REV 1)
- Used JTAG interface
- A detailed description of the problem

4 Guarantee

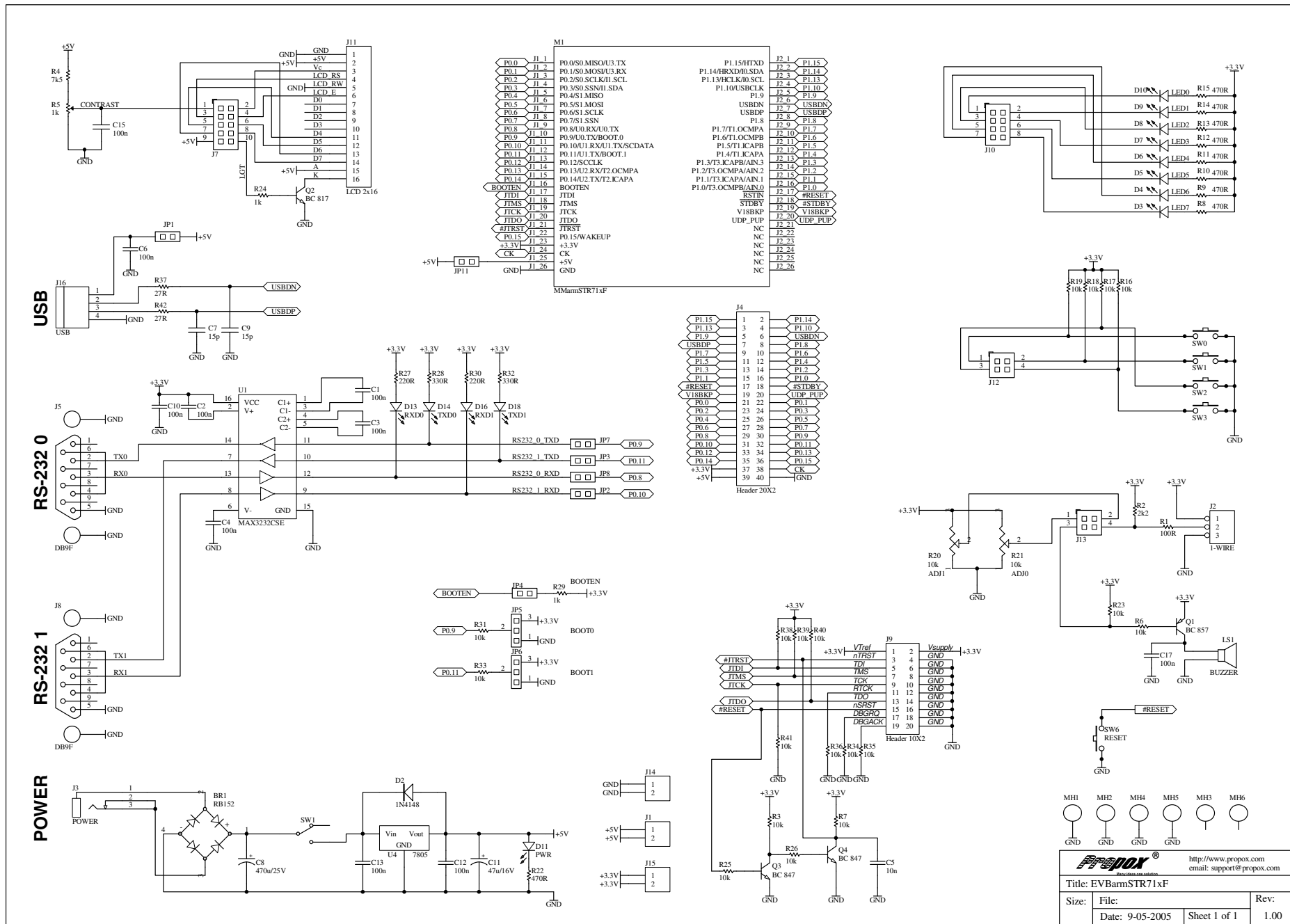
The MMstr71xF minimodule and EVBstr71xF board are covered by a six-month guarantee. All faults and defects not caused by the user will be removed at the Producer’s cost. Transportation costs are borne by the buyer.

The Producer takes no responsibility for any damage and defects caused in the course of using the MMstr71xF or EVBstr71xF.

5 Board layout and dimensions



6 Schematic



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Title: EVBarmSTR71xF			
Size:	File:	Rev:	
Date: 9-05-2005	Sheet 1 of 1	1.00	