Fubarino™ SD Reference Manual

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Introduction:

The Fubarino™ SD is a small microcontroller board that uses a powerful PIC32 microcontroller. It is chipKIT™/MPIDE compatible and can run the same sketches that run on an Arduino™. It is designed to have all I/O pins on either side of the board in a traditional DIP pattern so that it can easily be plugged into a breadboard. It has a USB connector for power, programming, and a connection to a PC. It also has a microSD slot for increased storage.

Features:

- PIC32MX440F256H (Fubarino SD v1.4) or PIC32MX795F512H (Fubarino SD v1.5) microcontroller, which includes either 256KB or 512KB Flash and 32K or 128KB of RAM
- Supported as development target from within MPIDE
- 45 I/O pins
- microSD slot connected to hardware SPI port
- Pads for 32 KHz crystal
- USB connector for power, programming, and connection to PC (serial, mass storage, etc.)
- Two buttons: RESET for resetting the board, and PRG for getting into bootloader mode and user application use
- USB bootloader pre-programmed at the factory – no other hardware needed to program board
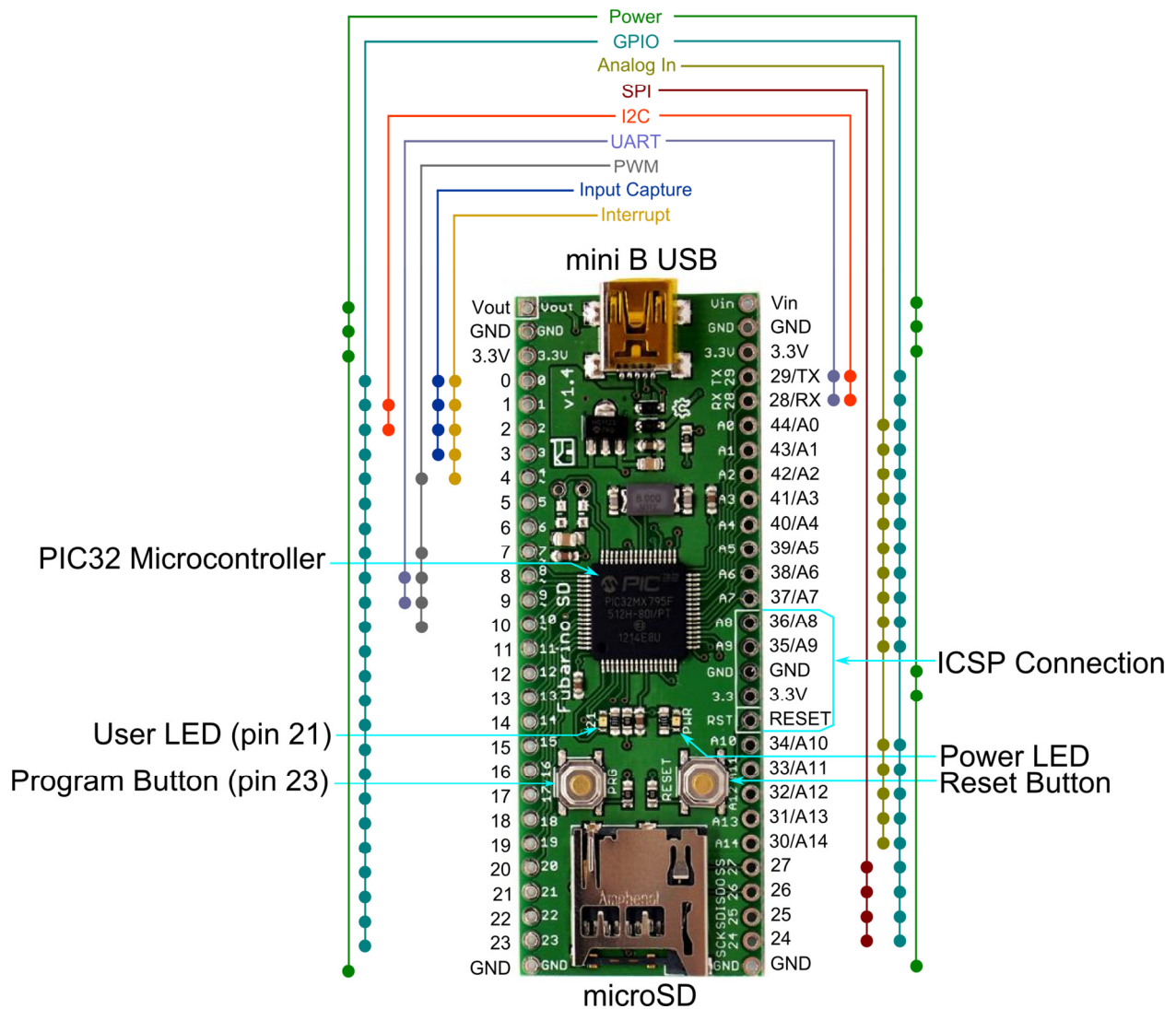
Figure 1 : FubarinoSD Pin Map

Entering Bootloader Mode

To enter bootloader mode (also called programming mode) simply press the PRG button while pressing and releasing the RESET button. As long as the PRG button is held down when the RESET button is released, the bootloader will start waiting for a new program to be downloaded over USB. It will wait indefinitely.

The bootloader on the Fubarino SD implements the avrdude STK500 v2 protocol, just like the other chipKIT™/MPIDE boards.

Programming in MPIDE

To program the Fubarino SD board from within MPIDE, simply download the latest MPIDE version, http://chipkit.net/started/install-chipkit-software/, unzip and run it, and select Fubarino SD from the Tools->Boards->Fubarino menu. Then, put the Fubarino SD into bootloader mode (see above), and then select the proper serial port in the Tools->Serial Port menu.

After you enter your sketch and click the Upload button, MPIDE will compile your sketch and then upload it to the Fubarino SD. After the upload is complete, the Fubarino SD will automatically reset and immediately begin running your sketch code. This includes sending information to the USB serial, UART1, and UART2.

Serial communications

The Fubarino SD board has two hardware serial ports: UART2 on pins 29 (TX) and 28 (RX), and UART1 on pins 9 (TX) and 8 (RX). It also has a USB serial port that operates as the default serial port. See the Code Examples wiki page on the Fubarino SD website for example sketch code on how to uses the three serial ports.

- USB serial init: Serial.begin()
- On board serial1 pins 8 (RX), 9 (TX): Serial0.begin()
- On board serial2 pins 28 (RX), 29 (TX): Serial1.begin()

Using the microSD

The Fubarino SD has a single SPI port, which is tied to the microSD memory card slot as well as pins 24 through 27. The standard SD library that comes with MPIDE will work with the FubarinoSD microSD slot without modifications.

Power

The Fubarino SD can be powered in a number of different ways.

1. USB : When 5V are present on the USB connector (from a PC or a powered hub for example), the FubarinoSD will use this power source. This power source has a reverse protection diode connection to the 3.3V regulator. If both USB and Vin are powered, whichever is higher will end up providing the power to the regulator.
2. Vin pin: You can also place 2.8V to 13.2V on the Vin pin to power it from an external power source. This power source has a reverse protection diode connection to the 3.3V regulator. If both USB and Vin are powered, whichever is higher in voltage will power the device.
3. 3.3V pin(s): You can power the FubarinoSD by connecting a 3.3V source to either 3.3V pin. You must be careful not to exceed 3.6V on these pins or the PIC32 will be destroyed.

Fubarino SD Versions

Fubarino SD versions 1.0 to 1.3 were not produced in any number and were not widely distributed.

Fubarino SD version 1.4 is being manufactured and sold by [SeeedStudio](). It uses the PIC32MX440F256H processor, which has 256KB of Flash and 32KB of RAM. Because the memory size is different from other Fubarino SD boards, if you have this version of the board, you should use the "Fubarino SD (Seesd)" board in the MPIDE Boards->Fubarino menu.

Fubarino SD v1.5 was the first version Microchip built, and uses a PIC32MX795F512H PIC32 part. This part has 512KB of Flash and 128KB of RAM. Make sure to select "Fubarino SD" from the MPIDE Boards->Fubarino menu for version 1.5 boards.

Pin Reference

This table provides a cross reference of all functions and labels for each pin of the Fubarino SD. Note that the 'Fubarino Pin' is the pin number of the entire board, starting with pin 1 = Vout and correspond to the J2 and J3 pin numbers in the schematic. The 'Arduino Pin' is the pin number you use in your code, and is what is listed on the silk screen of the board.

Fubarino Pin	Arduino Pin	Analog	PIC32 Pin	Silk Name	Alt functions	5V tolerant?
J2-1	-	-	-	Vout	-	-
J2-2	-	-	-	Gnd	-	-
J2-3	-	-	-	3.3V	-	-
J2-4	Pin 0	-	RD8	0	RTCC/IC1/INT1	Yes
J2-5	Pin 1	-	RD9	1	U1CTS/SDA1/IC2/INT2	Yes
J2-6	Pin 2	-	RD10	2	SCL1/IC3/PMCS2/PMA15/INT3	Yes
J2-7	Pin 3	-	RD11	3	IC4/PMCS1/PMA14/INT4	Yes
J2-8	Pin 4	-	RD0	4	OC1/INT0/RD0	Yes
J2-9	Pin 5	-	RC13	5	SOSCI/CN1	No
J2-10	Pin 6	-	RC14	6	SOSCO/T1CK/CN0	No
J2-11	Pin 7	-	RD1	7	U1RTS/OC2	Yes
J2-12	Pin 8	-	RD2	8	U1RX/OC3	Yes
J2-13	Pin 9	-	RD3	9	U1TX/OC4	Yes
J2-14	Pin 10	-	RD4	10	OC5/IC5/PMWR/CN13	Yes
J2-15	Pin 11	-	RD5	11	PMRD/CN14	Yes
J2-16	Pin 12	-	RD6	12	CN15	Yes
J2-17	Pin 13	-	RD7	13	CN16	Yes
J2-18	Pin 14	-	RF0	14		Yes
J2-19	Pin 15	-	RF1	15		Yes
J2-20	Pin 16	-	RE0	16	PMD0	Yes
J2-21	Pin 17	-	RE1	17	PMD1	Yes
J2-22	Pin 18	-	RE2	18	PMD2	Yes
J2-23	Pin 19	-	RE3	19	PMD3	Yes
J2-24	Pin 20	-	RE4	20	PMD4	Yes
J2-25	Pin 21	-	RE5	21	PMD5	Yes
J2-26	Pin 22	-	RE6	22	PMD6	Yes
J2-27	Pin 23	-	RE7	23	PMD7	Yes
J2-28	-	-	-	GND	-	-

J3-1	-	-	-	GND	-	-
J3-2	Pin 24	-	RG6	SCK/24	SCK2/PMA5/CN8	Yes
J3-3	Pin 25	-	RG7	SDI/25	SDI2/PMA4/CN9	Yes
J3-4	Pin 26	-	RG8	SDO/26	SDO2/PMA3/CN10	Yes
J3-5	Pin 27	-	RG9	SCK/27	SS2/PMA2/CN11	Yes
J3-6	Pin 30	A14	RB4	A14	AN4/C1IN-/CN6	No
J3-7	Pin 31	A13	RB3	A13	AN3/C2IN+/CN5	No
J3-8	Pin 32	A12	RB2	A12	AN2/C2IN-/CN4	No
J3-9	Pin 33	A11	RB1	A11	PGEC1/AN1/VREF-/CVREF-/CN3	No
J3-10	Pin 34	A10	RB0	A10	PGED1/AN0/VREG+/CVREF+/PMA6/CN2	No
J3-11	-	-	MCLR	RST	MCLR	Yes
J3-12	-	-	-	3.3V	-	-
J3-13	-	-	-	GND	-	-
J3-14	Pin 35	A9	RB7	A9	PGED2/AN7	No
J3-15	Pin 36	A8	RB6	A8	PGEC2/AN6/OCFA	No
J3-16	Pin 37	A7	RB8	A7	AN8/U2CTS/C1OUT	No
J3-17	Pin 38	A6	RB9	A6	AN9/C2OUT/PMA7	No
J3-18	Pin 39	A5	RB10	A5	TMS/AN10/CVREFOUT/PMA13	No
J3-19	Pin 40	A4	RB11	A4	TDO/AN11/PMA12/RB11	No
J3-20	Pin 41	A3	RB12	A3	TCK/AN12/PMA11	No
J3-21	Pin 42	A2	RB13	A2	TDI/AN13/PMA10	No
J3-22	Pin 43	A1	RB14	A1	AN14/U2RTS/PMALH/PMA1	No
J3-23	Pin 44	A0	RB15	A0	AN15/OCFB/PMALL/PMA0/CN12	No
J3-24	Pin 28	-	RF4	RX/28	SDA2/U2RC/PMA9/CN17	Yes
J3-25	Pin 29	-	RF5	TX/29	SCL2/U2TX/PMA8/CN18	Yes
J3-26	-	-	-	3.3V	-	-
J3-27	-	-	-	GND	-	-
J3-28	-	-	-	Vin	-	-

Schematic

For the schematic, please see the Fubarino_SD_v15_sch.pdf file on the Fubarino SD website.

https://github.com/fubarino/fubarino.github.com/blob/master/sd/v1.5/Fubarino_SD_v15.sch?raw=true

More Information

The best places to get support for Fubarino Mini are

- Main chipKIT website
- chipKIT forum

License

The Fubarino series of boards are released by Schmalz Haus LLC and FubarLabs under a Solderpad Hardware License v0.51. For more information, see: http://solderpad.org/licenses/SHL-0.51/

Developers

The Fubarino series of boards were developed by Rick Anderson of [FubarLabs](#) and Brian Schmalz of [Schmalz Haus LLC](#). They are registered chipKIT^{TM} boards and are designed to be programmed with the MPIDE system.