

SEED TECHNOLOGY INC (SEEEDUINO)

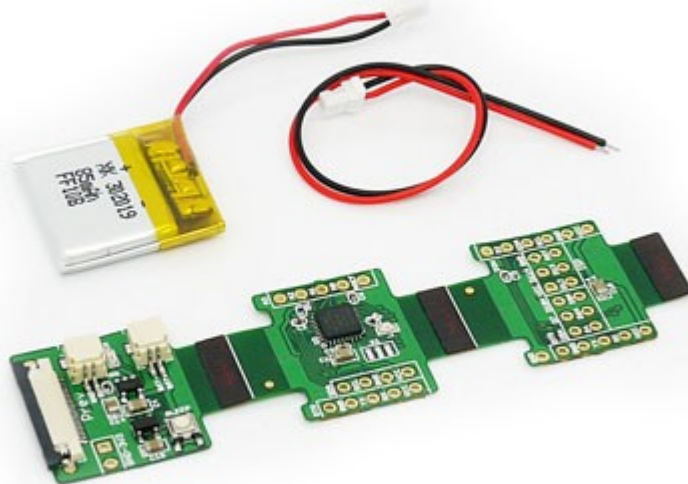
Seeeduino Film

Model: ARD129D2P

Introduction

Seeeduino Film is an [Arduino](#) compatible development platform for space-sensitive projects. It's flexible, super slim, with built-in Li-Po charger, suitable to build wearable applications. Film and other extension FRAMES could be simply connected via the 20pin universal bus like a chain, native 2.54mm pitch pins also enables quick prototyping.

Model: [ARD129D2P](#)



Features

- Arduino compatible
- Flexible
- Ultra small/slim form factor
- Transform by cutting and chaining
- Full functional Atmega168
- 0.1" pitch pad breakout
- 20pin daisy-chain flex bus
- UartSBee programming compatible
- Built-in charger circuit
- Reinforced to increase endurance

Application Ideas

- Mobile USB Host power
- Energy harvester
- Sport equipments
- Robotics
- Navigation
- Other off the grid projects

Cautions

Film is super thin and slim, it is easily damaged, take care when you setup.

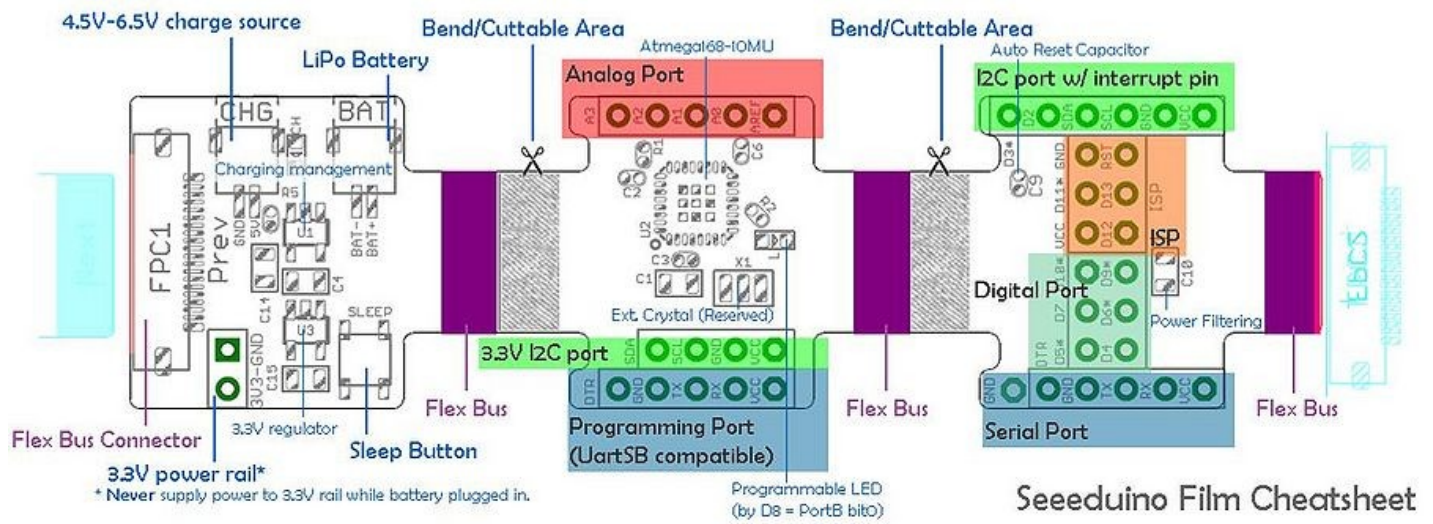
Key Specification

Microprocessor	Atmega168
Indicators	LED on digital pin8(Port B 0)
Charge voltage	4.5V~6V
Work voltage	3.3V
IO counts	19(15 IO on chain connector)
IO level	3.3V (5V compatible)
IO Connectivity	20p FPC connector, 0.1" pin header
ADC input	6(2 ADC on chain connector)
Program interface	Serial/ISP
Communication Protocol	Serial/I2C/SPI
Frequency	8MHz
Outline Dimension	77.5mm*20.3mm*1.57(3.2 w/ battery connector)mm

Electrical Characteristics

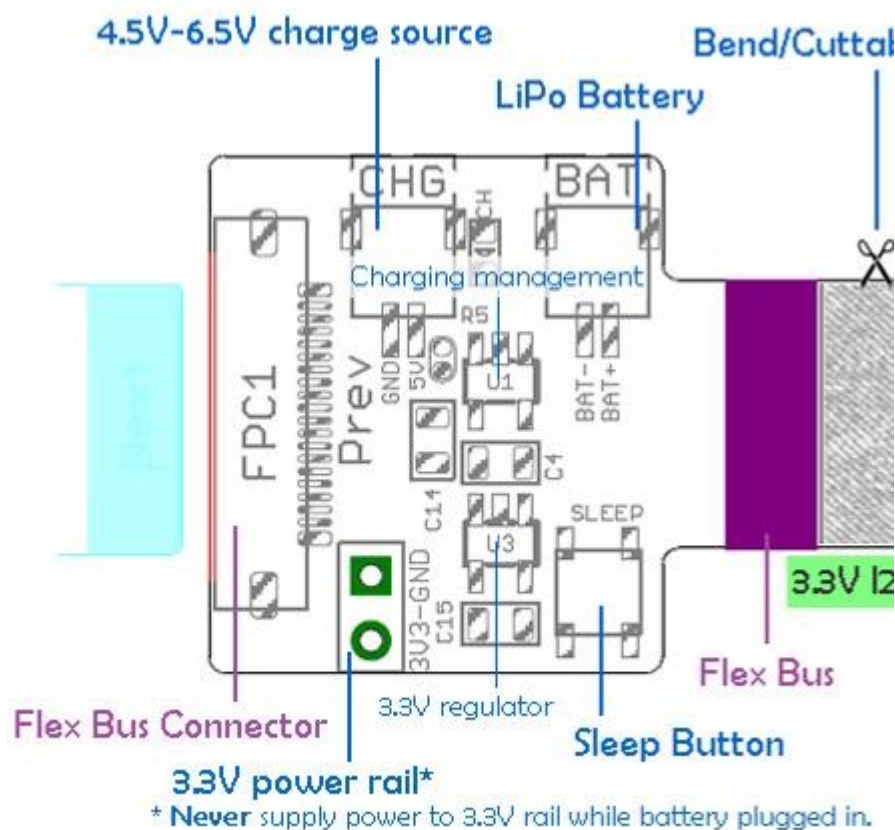
Specification	Min	Norm	Max
Input Voltage	3VDC	3.3VDC	3.6VDC
Idle Current	-	5.2mA	-
Power-down Current	1μA	2μA	5μA

Pin definition and Rating



Seeduino FILM has three FRAMES: power, mainboard, and breakout. They are connected by flex 20pin FPC bus, which can be bended to fit into various spaces, or cut and reformed easily.

Power Frame



Power FRAME contains a handy power management circuit for Li-Po battery charging and regulation.

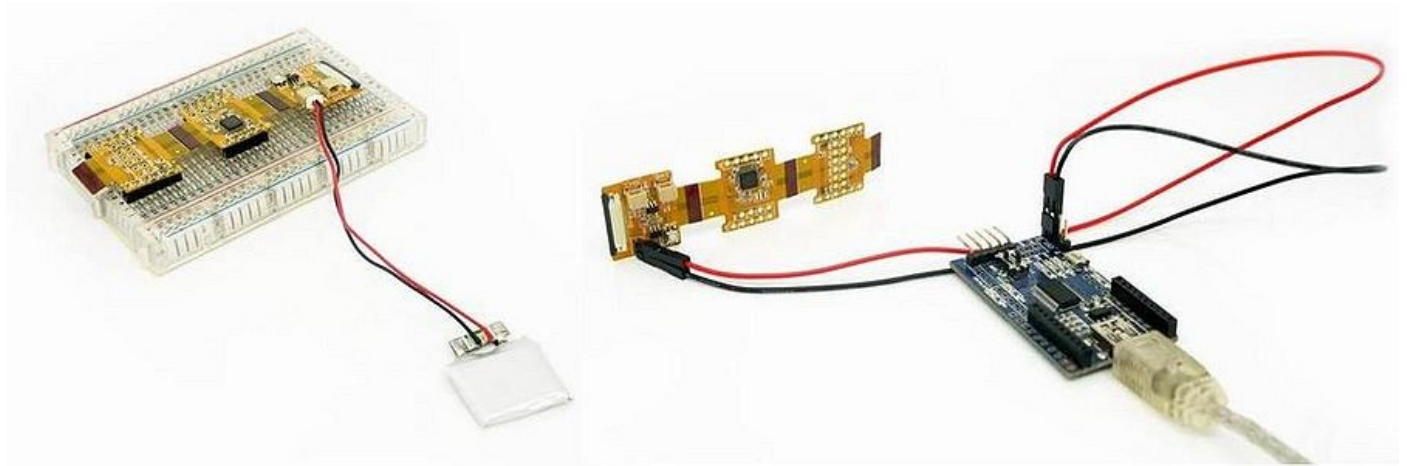
Charging

The management IC will handle the charging progress with max 280mA current, and keep 3.7v battery working properly. It drains power via CHG jack, most 4.5 ~ 6Vdc source like solar panel, wireless charger, power adapter and etc could be used.

Power Rails

Battery output is regulated to 3.3Vdc (max 150mA) for power rail and flex bus. Battery is a must even plugged power supply to CHG connector.

In simpler usage, applying 3.3Vdc directly to power rail could skip the power management circuit and power up the system too. Please remove battery to avoid damage when used this way.

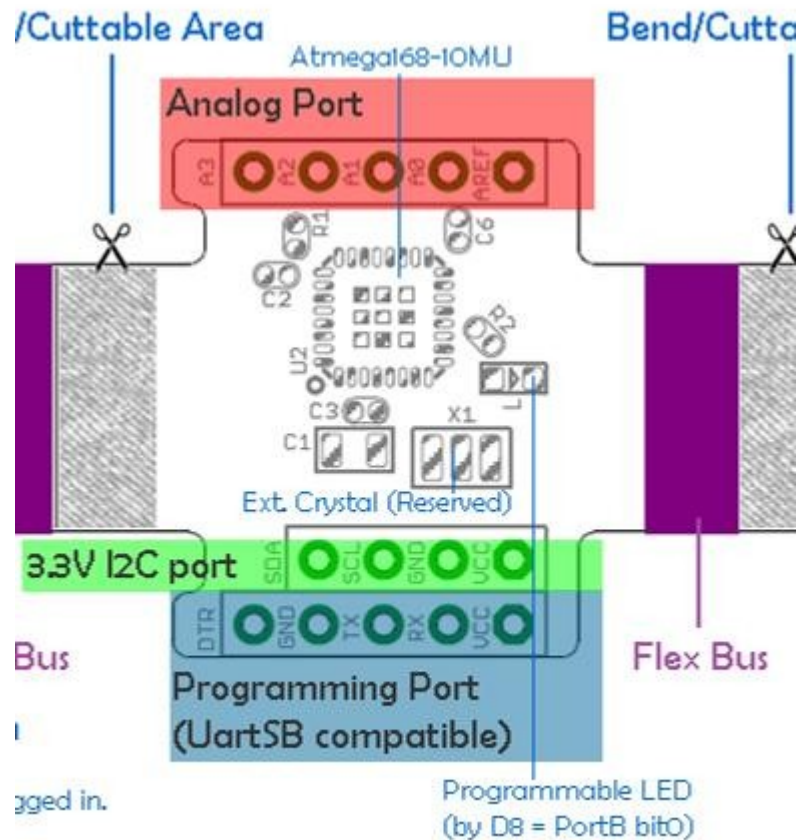


Sleeping Beauty

A sleep button is included instead of power switch. The button is connected to external interrupt (PD2), by including corresponding code in firmware, the system could go to either power down mode ($<5\mu\text{A}$) or idle mode ($<0.8\text{mA}$). To wake up it: 1) press sleep button again or 2) trigger any external interrupt OR 3) timer (idle mode). Sleep button could be reused for other purpose by changing software.

Power Consumption

When working at 3.3v 8Mhz by default, the minimal system power consumption is about 3mA. When working in power down mode, consumption could be minimal 1.2uA (!).



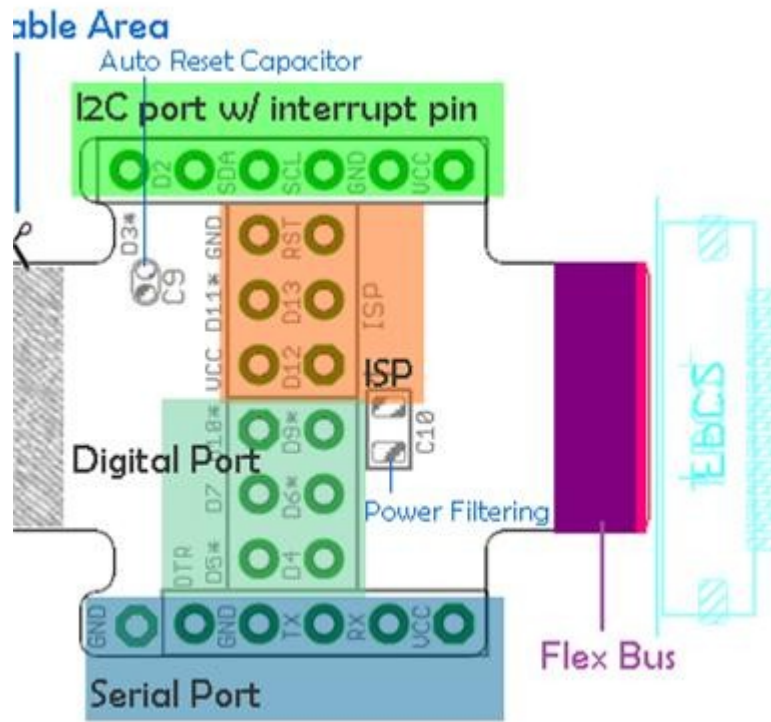
Mainboard FRAME carries an Arduino compatible AVR MCU Atmega168-10MU. It runs either at default 8Mhz with internal crystal or higher with external crystal (reserved). It includes 2.54 grid pad for prototyping and easier extension. You may even nail them into breadboard by a pin header for early development.

INTERFACE: Mainboard includes 4 Analog/Digital port with 1 Aref and I2C, Programming port to provide core functions for extremely compact application. Further pins are still extensibe via Flex Bus.

4 Analog port (A0-A3) with Aref (Analog reference) pads are placed as close to MCU as possible to avoid interference. They can be used to control or input as digital port too. The second row of 4 pads are for 3.3v and 5v I2C buses, please note other I2C devices should be able to read 3.3v as high. The easiest way to program FILM is to use UartSB which is direct plug. Other USB to serial convertor will do the job well, just be ware on the pad sequence.

INDICATOR LED: Mainboard has a programmable LED wired to Digital 8 pin. Maybe wire the battery pin to the AD port? The LED could then tell the battery level. The last usage might be shut down to save some mA,.

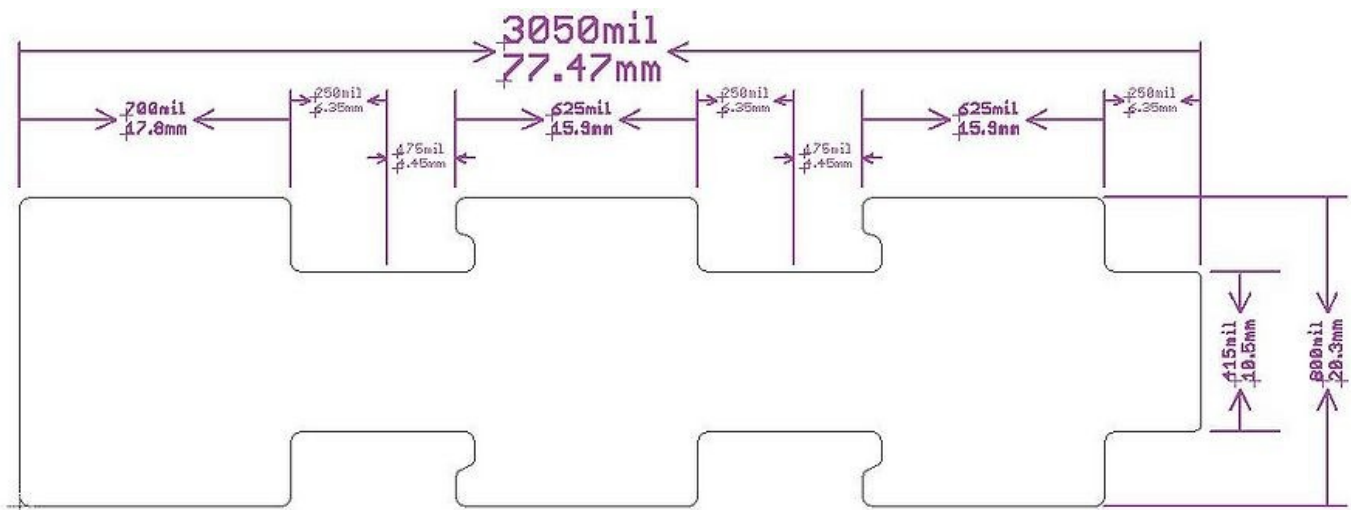
EXTERNAL CRYSTAL: Reserved for Asynchronous Timer/Counter2. If the Internal Calibrated RC Oscillator is used as FILM clock source, PB7..6 is used as TOSC2..1 input for the Asynchronous Timer/Counter2. Set AS2 bit in ASSR to enable this.



Breakout FRAME enables expansion and prototyping of FILM. It completely breakout 20pin flex bus to 2.54mm pin header pads. The pads are grouped by 1) I2C port w/interrupt pin, 2) ISP port 3) Digital Port 4) Serial port and an extra GND for random usage. The end of breakout FRAME is a ready for expansion; just insert it into Flex Bus Connectors on other FRAMEs to extend.

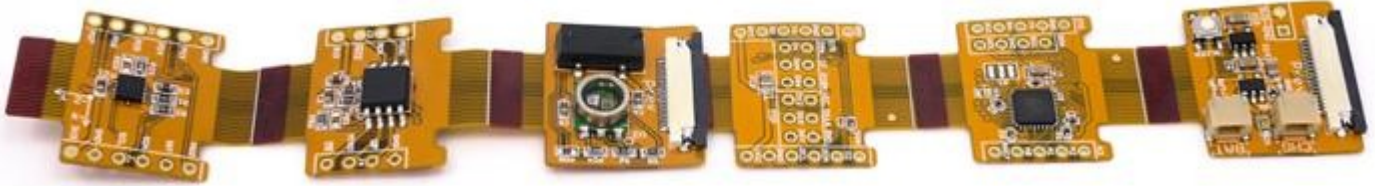
Shapes and 20pin FPC Bus

Seeeduino FILMs and FRAMEs are sharing the same shape, consisted of 3 FRAMEs on a whole FPC. Same shape makes manufacturing and usage easier. They are designed to be cut or re-grouped, you are the tailor.



Seeeduino FILM and its extension FRAMEs use unified 20pin FPC bus linked in daisy-chain. You may easily cascade multiple FRAMEs per requirement. The connection could be bent easily to fit into various spaces. Any

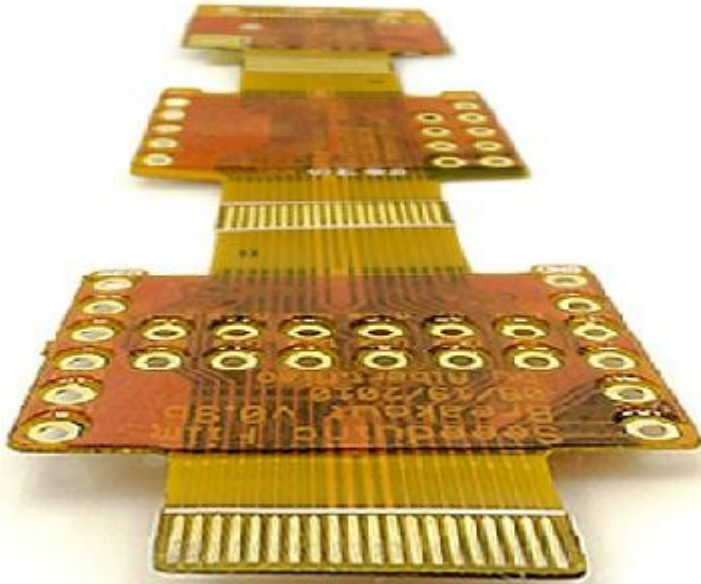
0.5mm pitch FPC 0.3mm thick connection ribbon could be used to extend the connection further.



Flex Bus Pin Definition

FPC_0.5_20PD_ONBOARD

1	1	PD0/RXD
2	2	PD1/TXD
3	3	PD2
4	4	PD3
5	5	PD4
6	6	PD5
7	7	PD6
8	8	PD7
9	9	VCC
10	10	GND
11	11	GND
12	12	VCC
13	13	PB1
14	14	PB2
15	15	PB3/MOSI
16	16	PB4/MISO
17	17	PB5/SCK
18	18	PC4/SDA
19	19	PC5/SCL
20	20	A_RESET



Usage

1. Prototype

Lay the FILM on a breadboard; nail it with pin headers to start prototyping.

2. Transform

Cut off unnecessary FRAMEs and attach-on extension FRAMEs, battery, or customized circuits.

3. Seal

Fold down carefully to the desired dimension and bring it on!

Support

Seeeduino Film is 100% open source; you are welcomed to re-use our design for free. Please refer to our product page for more info including accessories, source files, user project, support and etc.

Here is the [seeeduinofilm.zip](#). If you have questions or other better design ideas, you can go to our [forum](#) or [wish](#) to discuss.

Resources

- [Film and Frame Tutorial](#)

- [seeeduinofilm.zip](#).

See Also

- [Seeeduino V2.2](#)
- [Seeeduino Motion Frame](#)

Licensing

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External Links

Links to external webpages which provide more application ideas, documents/datasheet or software libraries