

SparkFun DEV-11114

SparkFun Pro Mini ATmega328-3.3V/8MHz Development Board User Manual

Model: DEV-11114

1. INTRODUCTION AND OVERVIEW

The SparkFun Pro Mini ATmega328-3.3V/8MHz is a compact microcontroller development board designed for projects where space is a premium. It is compatible with Arduino boards and the Arduino IDE, offering a powerful ATmega328 microcontroller in a small form factor. This board operates at 3.3V and 8MHz, making it suitable for low-power applications and direct interfacing with 3.3V peripherals without additional level shifting.

This manual provides essential information for setting up, operating, and maintaining your SparkFun Pro Mini.

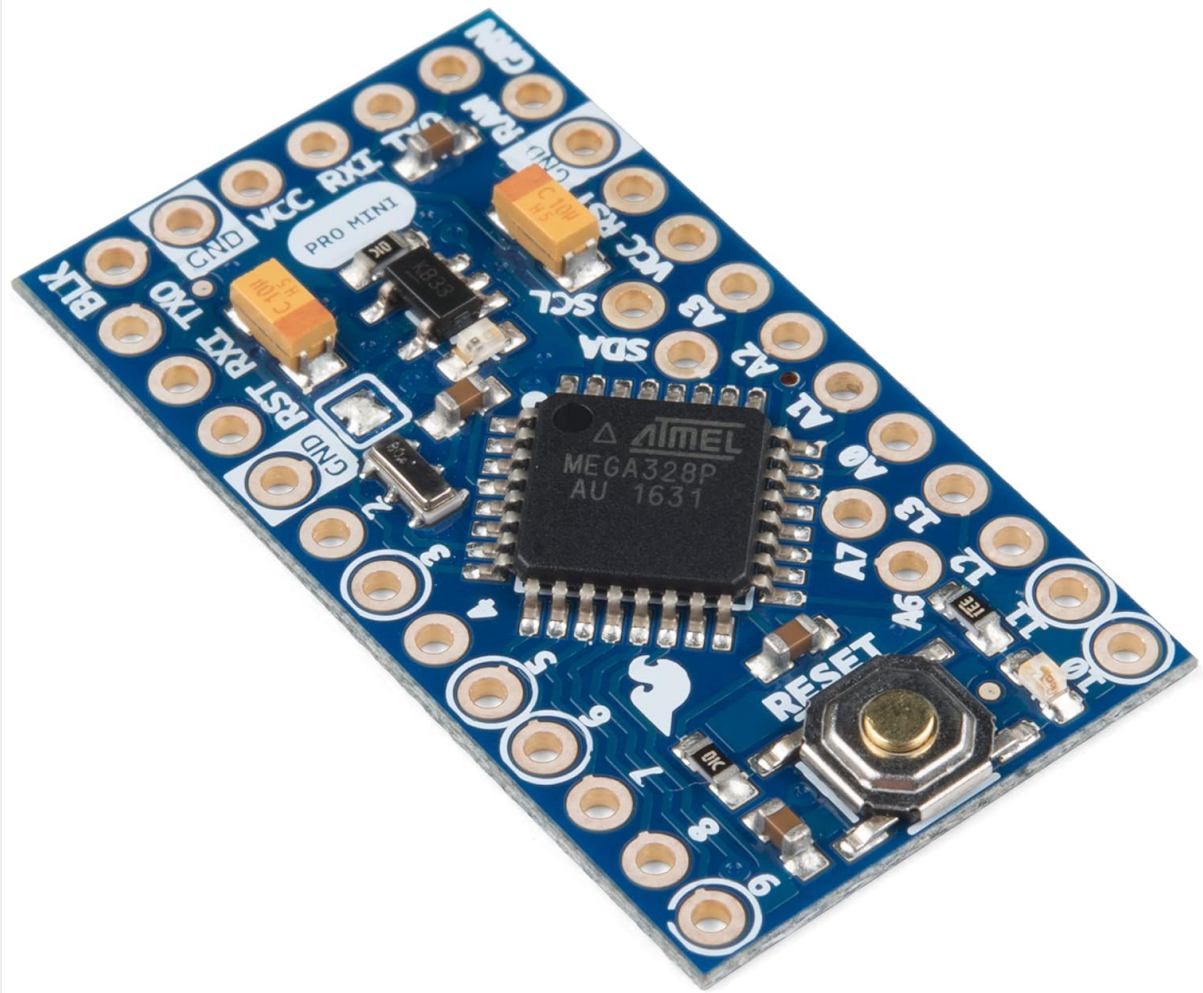


Figure 1: Top view of the SparkFun Pro Mini ATmega328-3.3V/8MHz Development Board.

2. KEY FEATURES

- **Microcontroller:** ATmega328 running at 8MHz with an external resonator (0.5% tolerance).
- **Operating Voltage:** 3.3V.
- **Power Input:** RAW pin supports 3.4V to 12V DC input; VCC pin requires regulated 3.3V.
- **Regulator:** On-board 3.3V regulator with a maximum 150mA output, over-current protected.
- **Connectivity:** Designed for direct connection to an FTDI Basic Breakout board (sold separately) for programming.
- **Analog Pins:** 8 analog input pins (A0-A7), with A4, A5, A6, A7 located off-edge.
- **Digital Pins:** Standard GPIO pins, including PWM capabilities.
- **Indicators:** On-board Power and Status LEDs.
- **Dimensions:** Approximately 0.7 x 1.3 inches (18 x 33mm).
- **I2C:** Footprints for optional I2C pull-up resistors.

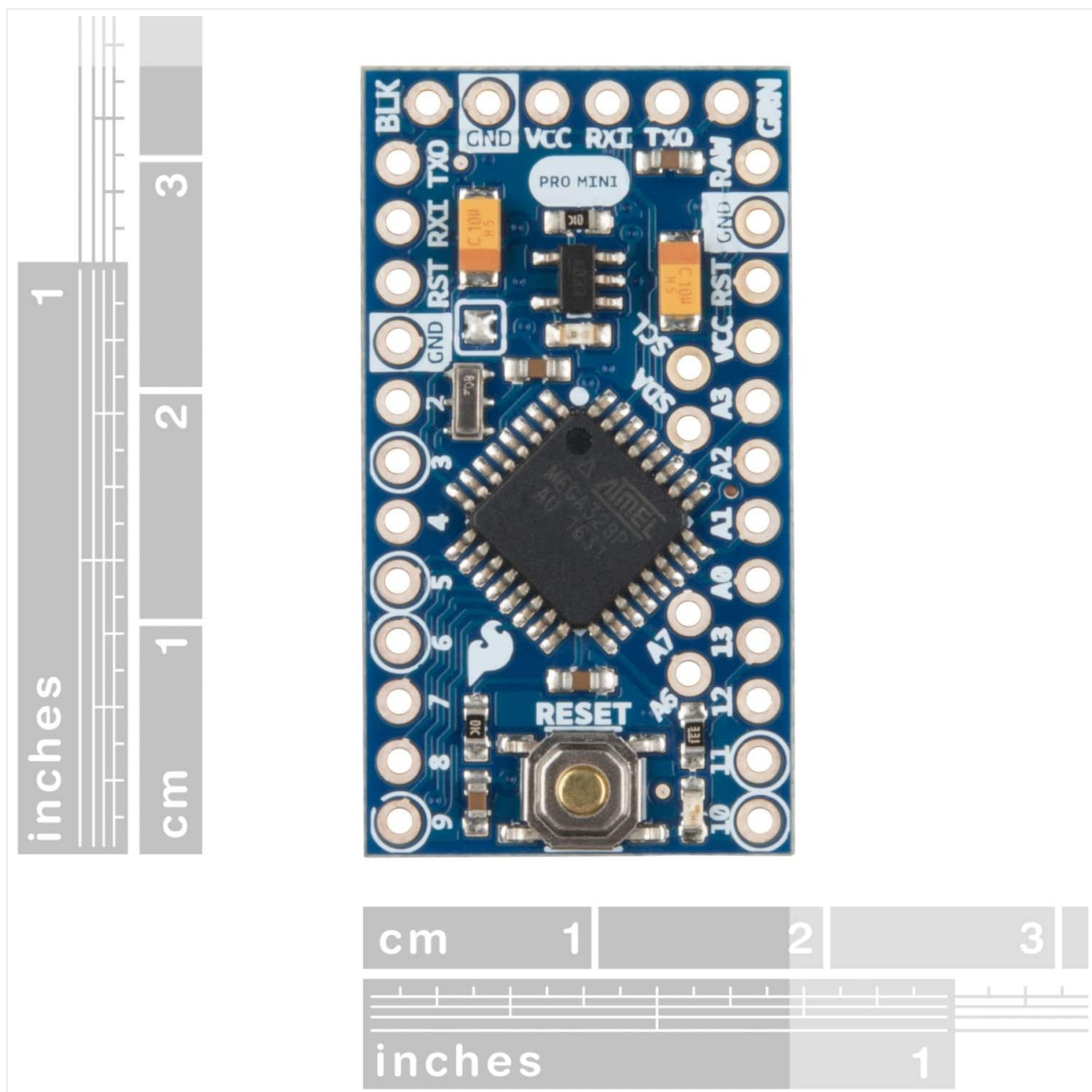


Figure 2: The SparkFun Pro Mini shown with a ruler, illustrating its compact dimensions.

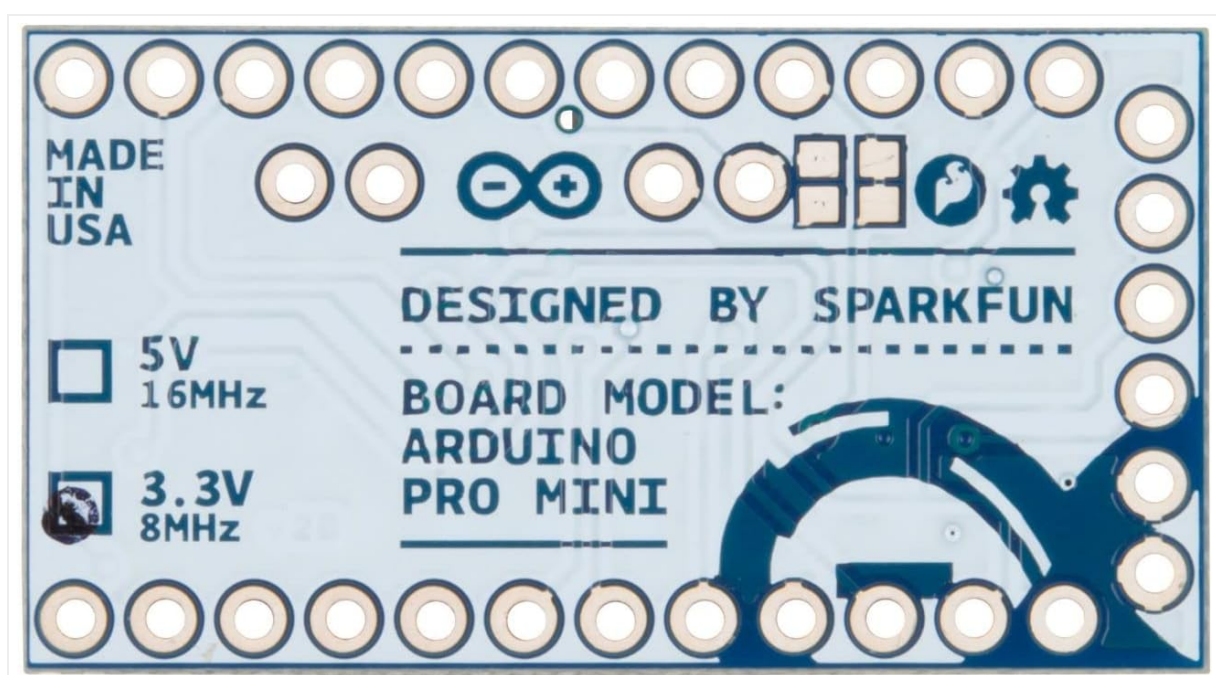
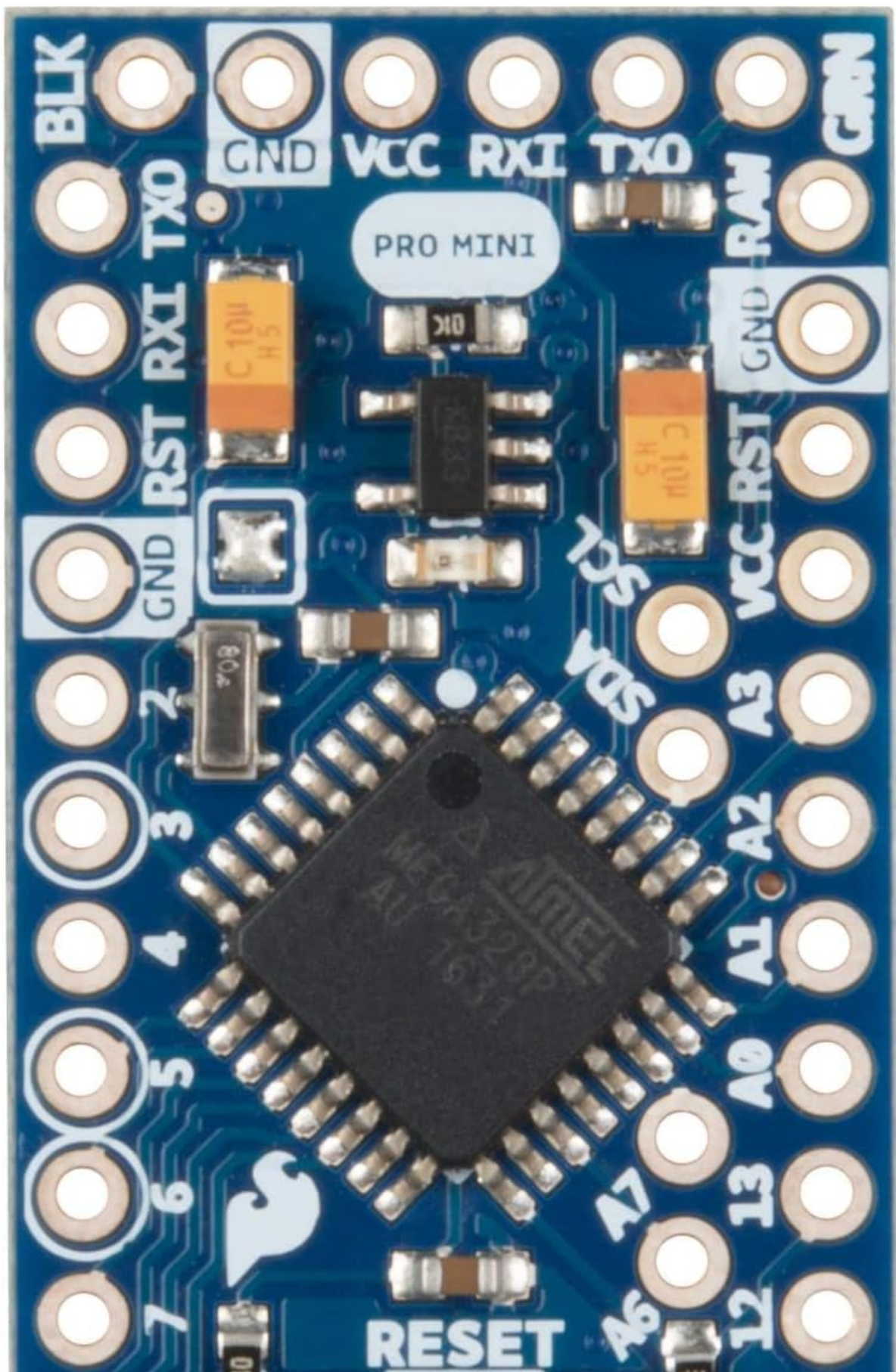


Figure 3: The underside of the Pro Mini, indicating its 3.3V and 8MHz operating characteristics.

3. SETUP AND CONNECTIONS

3.1 Pinout Overview

The Pro Mini features various pins for power, communication, and general-purpose input/output (GPIO). Understanding the pinout is crucial for proper integration into your projects.



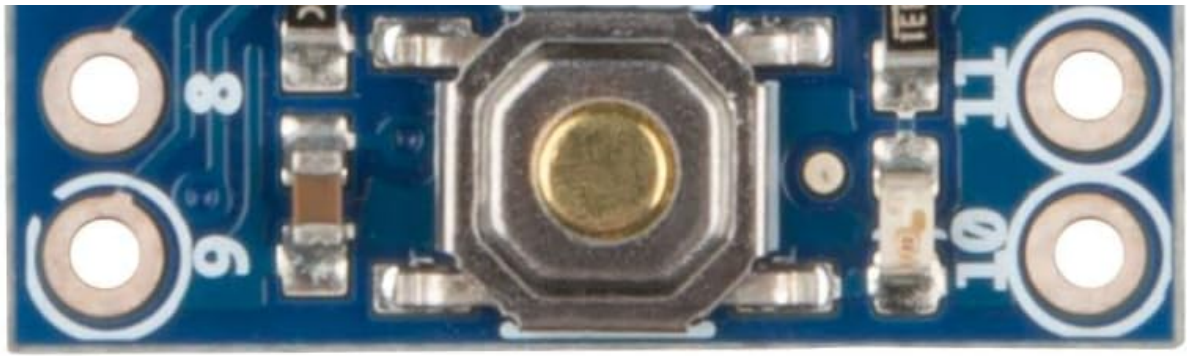


Figure 4: Top view of the Pro Mini, highlighting the various pin labels for identification.

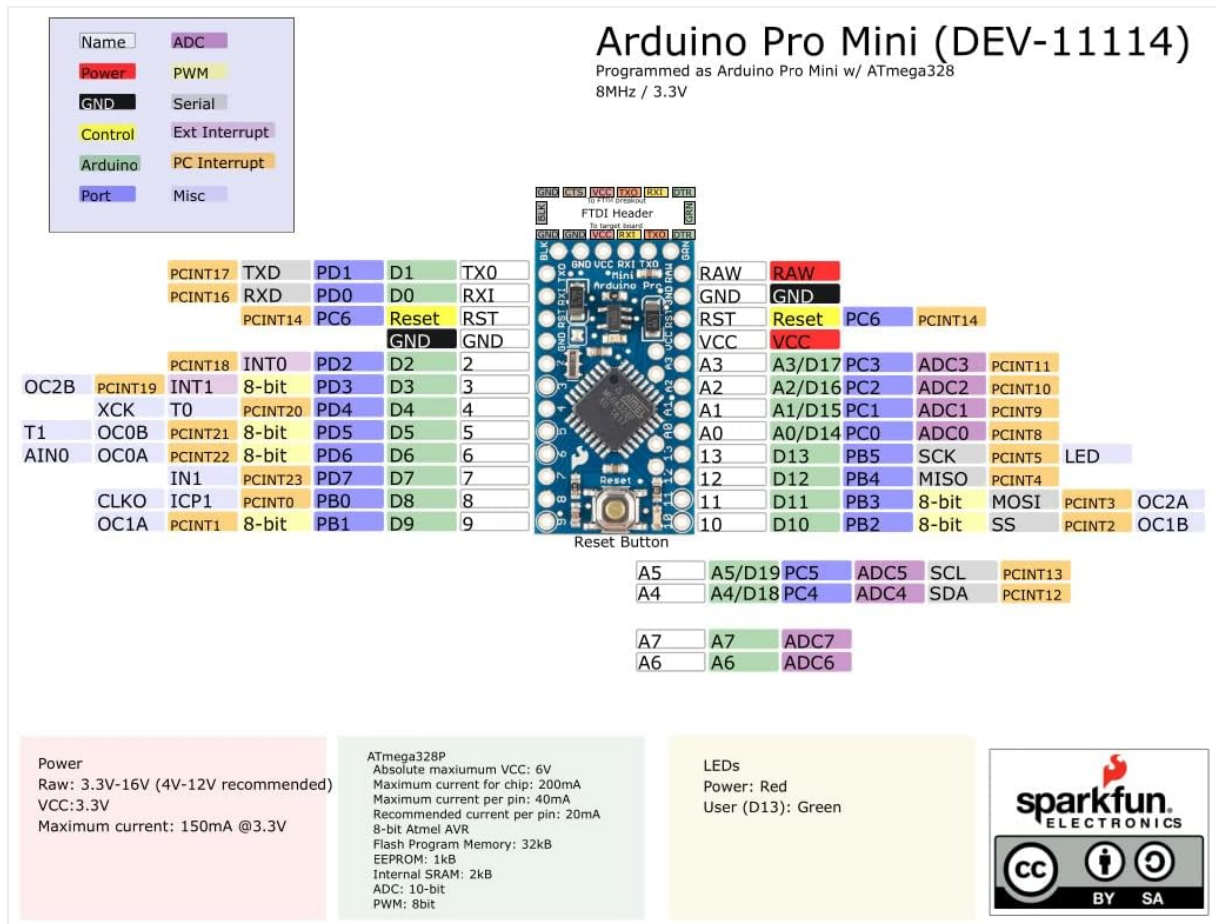


Figure 5: Comprehensive pinout diagram detailing the functions of each pin on the SparkFun Pro Mini.

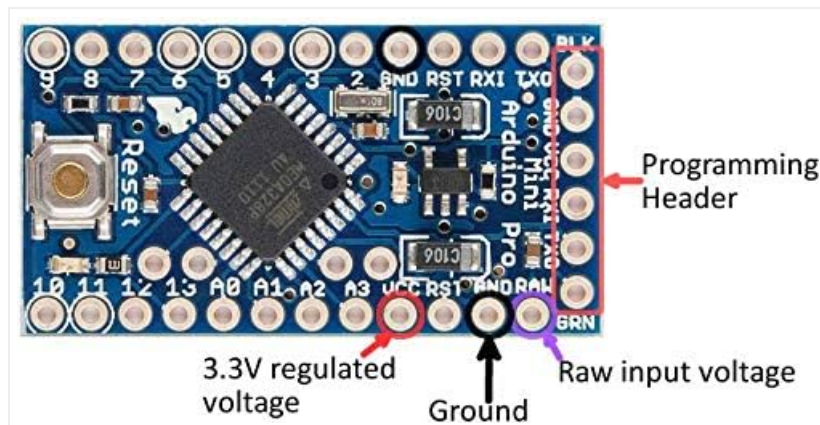


Figure 6: Close-up view of the Pro Mini, labeling the programming header, 3.3V regulated voltage, ground, and raw input voltage pins.

3.2 Powering the Board

The Pro Mini can be powered in two primary ways:

- **RAW Pin:** Connect an unregulated DC voltage source between 3.4V and 12V to the RAW pin. The on-board regulator will convert this to 3.3V for the microcontroller.
- **VCC Pin:** If you have a pre-regulated 3.3V power supply, connect it directly to the VCC pin. Do not apply more than 3.3V to this pin.

Ensure that the power source is correctly connected to avoid damage to the board. The board includes over-current protection for the regulator.

3.3 Programming the Board

The SparkFun Pro Mini does not have an on-board USB connector. To program the board, an external FTDI Basic Breakout board (or a compatible USB-to-serial converter) is required.

1. Connect the FTDI Basic Breakout board to the programming header pins on the Pro Mini. Ensure the pins (GND, VCC, RXI, TXO, RST, BLK) align correctly.
2. Connect the FTDI Basic Breakout board to your computer via a USB cable.
3. Open the Arduino IDE.
4. Select "Arduino Pro or Pro Mini" from the "Tools > Board" menu.
5. Select "ATmega328 (3.3V, 8 MHz)" as the processor.
6. Choose the correct COM port for your FTDI device under "Tools > Port".
7. You can now upload your sketches to the Pro Mini.

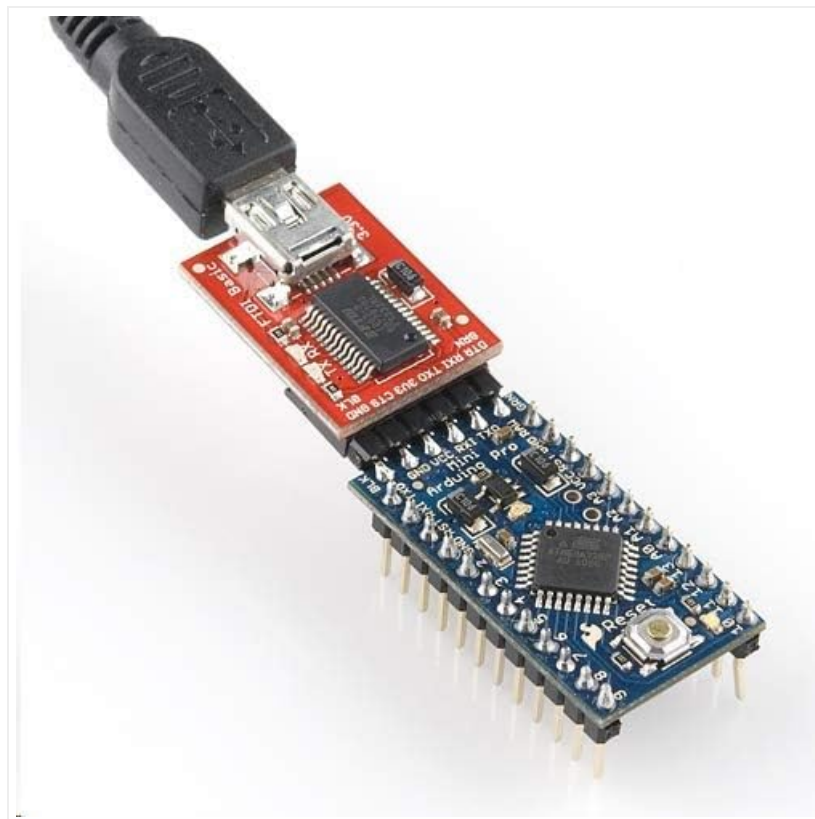


Figure 7: The SparkFun Pro Mini connected to an FTDI Basic Breakout board for programming via USB.

4. OPERATION

4.1 Basic Sketch Upload

After successfully connecting and configuring the board in the Arduino IDE, you can upload any compatible Arduino sketch. A common first step is to upload the "Blink" example sketch to verify basic functionality.

4.2 Connecting Peripherals

The 3.3V operating voltage of this Pro Mini makes it ideal for direct interfacing with many modern sensors and modules that also operate at 3.3V. When connecting peripherals, always ensure voltage compatibility. If a peripheral requires 5V, a logic level shifter will be necessary to prevent damage to the Pro Mini.

- **Digital I/O:** Use digital pins for on/off control, reading switches, or controlling LEDs.
- **Analog Input:** Pins A0-A7 can read analog sensor values.
- **Serial Communication:** Use RXI/TXO pins for serial communication with other devices.
- **I2C Communication:** The board supports I2C communication, with optional pull-up resistor footprints available.

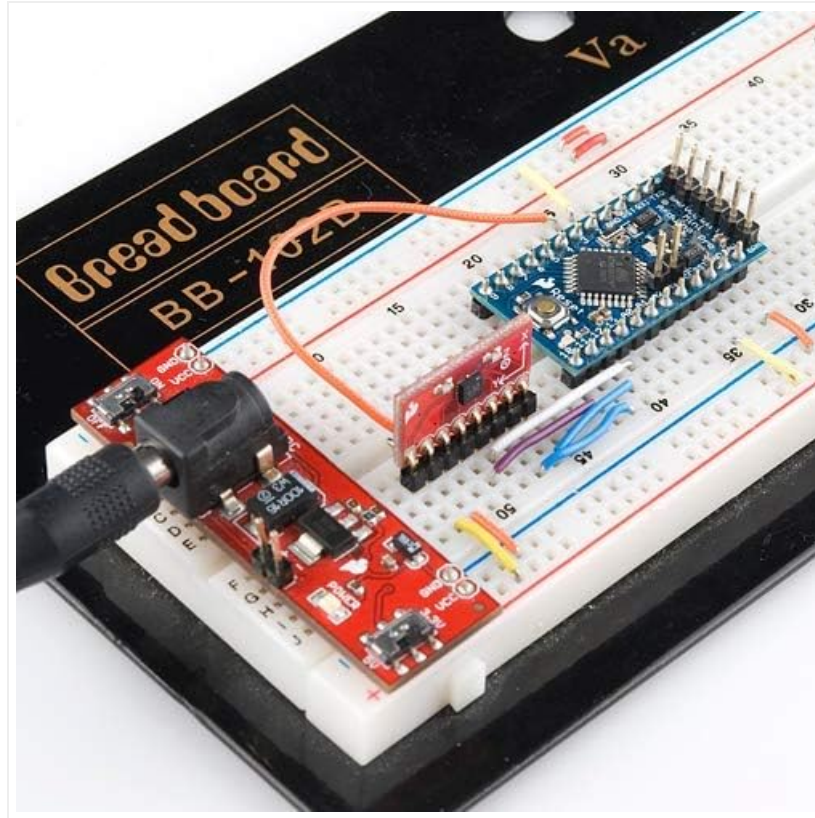
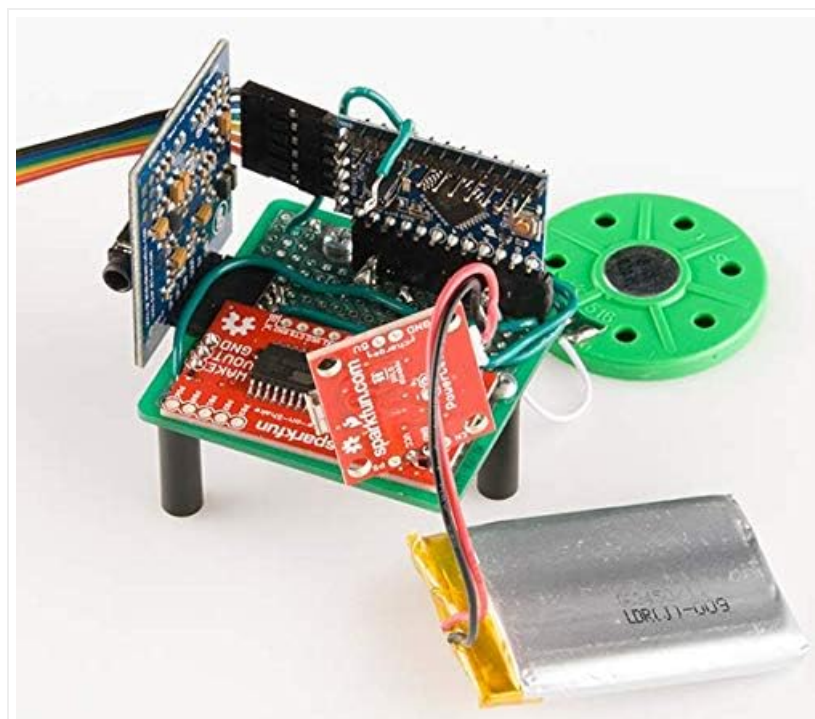


Figure 8: The Pro Mini integrated into a breadboard circuit with other electronic components, demonstrating typical usage.



5. MAINTENANCE

The SparkFun Pro Mini is a robust development board, but proper care ensures its longevity and reliable operation.

- **Handling:** Always handle the board by its edges to avoid touching components, especially the microcontroller, which can be sensitive to static electricity.
- **Storage:** Store the board in an anti-static bag when not in use, away from dust and moisture.
- **Cleaning:** If necessary, gently clean the board with isopropyl alcohol and a soft brush. Ensure the board is completely dry before applying power.
- **Power Supply:** Always verify your power supply voltage and polarity before connecting to the board. Incorrect voltage or reverse polarity can cause permanent damage.

6. TROUBLESHOOTING

- **Board Not Recognized by IDE:**
 - Ensure your FTDI Basic Breakout board drivers are correctly installed on your computer.
 - Verify that the FTDI board is properly connected to the Pro Mini's programming header.
 - Check that the correct COM port is selected in the Arduino IDE.
 - Confirm that "Arduino Pro or Pro Mini" is selected as the board and "ATmega328 (3.3V, 8 MHz)" as the processor.
- **Sketch Upload Fails:**
 - Check all connections between the FTDI board and Pro Mini.
 - Ensure the power supply to the Pro Mini is stable and within the specified range (3.3V to VCC or 3.4-12V to RAW).
 - Sometimes, pressing the reset button on the Pro Mini just before or during the upload process can help.
- **No Power/LEDs Off:**
 - Verify your power source is active and providing the correct voltage.
 - Check the polarity of your power connections.
 - If using the RAW pin, ensure the voltage is between 3.4V and 12V. If using VCC, ensure it is a regulated 3.3V.
- **Unexpected Behavior:**
 - Double-check your wiring for shorts or incorrect connections.
 - Ensure all connected peripherals are compatible with 3.3V logic levels. Use level shifters if necessary for 5V components.
 - Review your code for logical errors.

7. SPECIFICATIONS

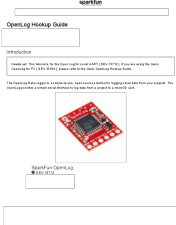
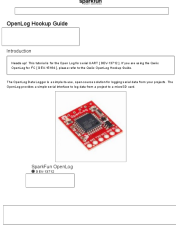
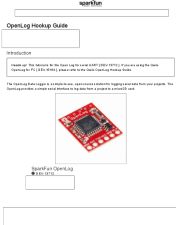
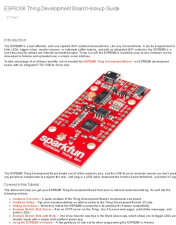
Feature	Specification
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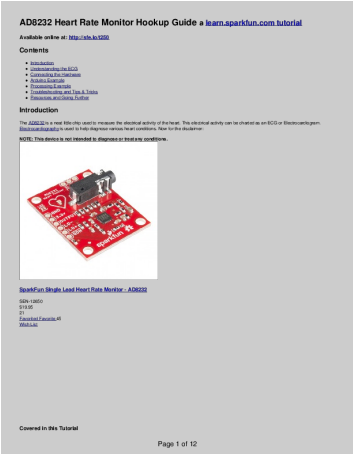
Feature	Specification
Microcontroller	ATmega328
Operating Voltage	3.3V
Input Voltage (RAW)	3.4V - 12V DC
Clock Speed	8 MHz
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Digital I/O Pins	14 (6 with PWM support)
Analog Input Pins	8 (A0-A7)
Max Current per I/O Pin	40 mA
Dimensions	0.7 x 1.3 inches (18 x 33 mm)
Weight	0.32 ounces
Connectivity Technology	I2C, Serial (UART)

8. WARRANTY AND SUPPORT

For technical support, warranty information, or further assistance with your SparkFun Pro Mini ATmega328-3.3V/8MHz Development Board, please refer to the official SparkFun Electronics website or contact their customer support directly.

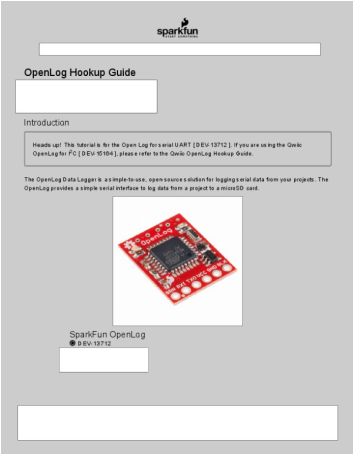
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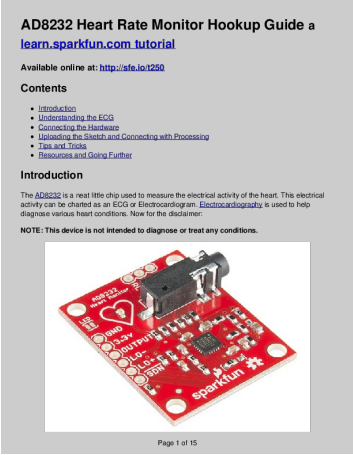
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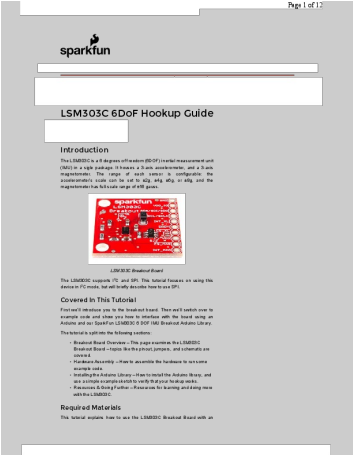
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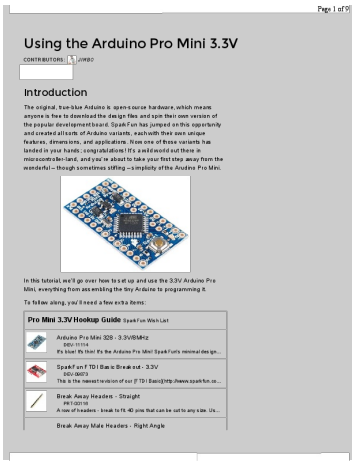
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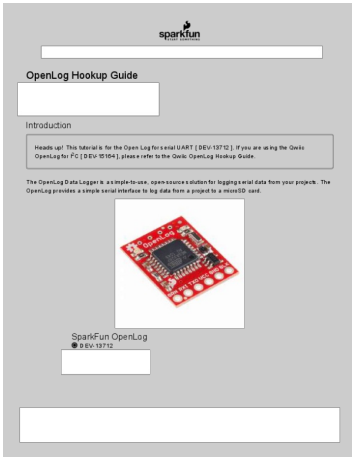
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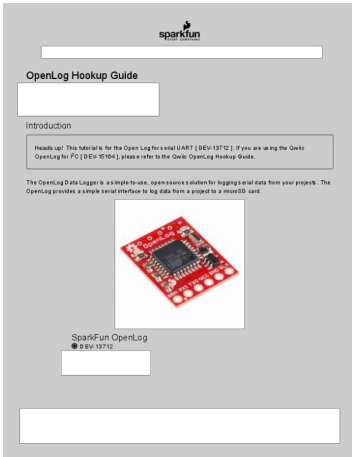
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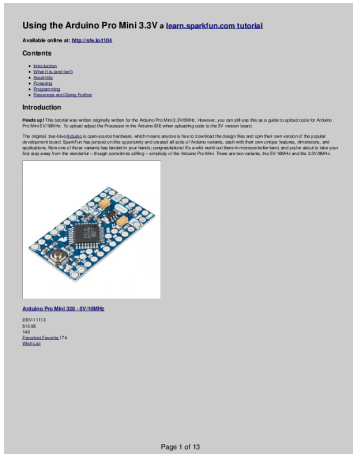
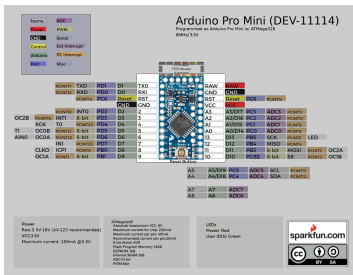
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Si4703 FM Radio Receiver Hookup Guide

Introduction

This breakout board enables you to receive FM radio stations, using the Si4703 FM chip from Silicon Labs. This is also useful when you need a simple, reliable, and small solution for the station ID and frequency data for a station.



Required Materials

You will need the following materials to work on this project:

- Si4703 Radio-Ready Board** - SparkFun Part # SI4703-RED
- Break Away Male Headers** - Right Angle, 0.100" Pitch, 10 pins (10-01000)
- SparkFun Pro Mini Board** - 3.3V, 8MHz, 1K (10-01000)
- Arduino Pro Mini Board** - 3.3V, 8MHz, 1K (10-01000)
- Arduino Pro Mini Board** - 5V, 16MHz, 1K (10-01000)

Keep in mind you will also need other components to complete the board, as well as other parts of the board, as well as a 3.3V jumper to plug into the Si4703 board.

Suggested Reading

For more information, see the Si4703 datasheet, the Si4703 and Si4703A.

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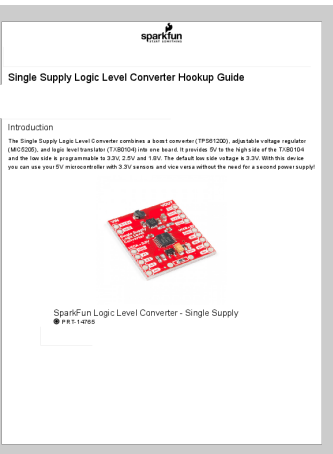
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Using the Arduino Pro Mini 3.3V

CONTRIBUTORS: JIMBO

Introduction

The original, true-blue Arduino is open-source hardware, which means anyone is free to download the design files and spin their own version of the popular development board. SparkFun has jumped on this opportunity and released all sorts of Arduino variants, each with their own unique features, dimensions, and applications. Now one of those variants has landed in your hands: the Arduino Pro Mini. It's a small, compact board with a microcontroller on board, and you're about to take your first step away from the wonderful - though sometimes tricky - simplicity of the Arduino Pro Mini.



In this tutorial, we'll go over how to set up and use the 3.3V Arduino Pro Mini, everything from assembling the tiny Arduino to programming it. To follow along, you'll need a few extra items:

Pro Mini 3.3V Hookup Guide (SparkFun Web Link)

Arduino Pro Mini 328 - 3.3V/8MHz (10-01000)

It's that's that! It's the Arduino Pro Mini! SparkFun's minimal design...

SparkFun FTDI Basic Breakout - 3.3V (10-01000)

It's that's that! It's the FTDI Basic! SparkFun's minimal design...

Break Away Headers - Straight (10-01000)

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Break Away Male Headers - Right Angle (10-01000)

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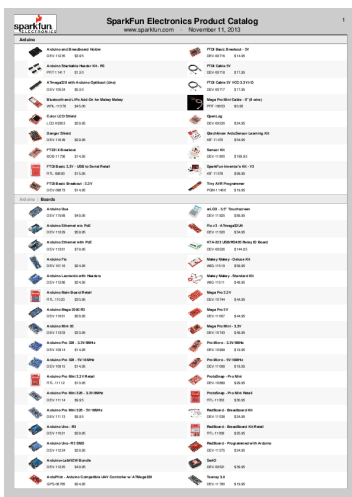
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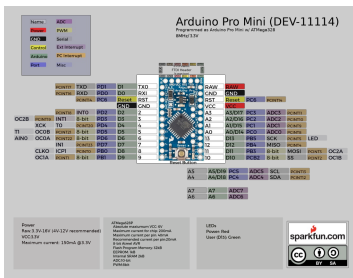
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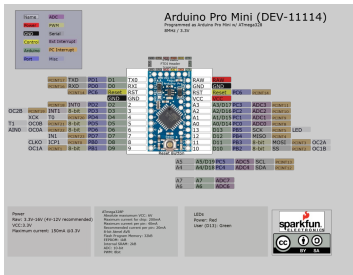


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Name Power GND Control Arduino Port ADC PWM Serial Ext Interrupt PC Interrupt Misc PCINT17 PCINT16 ... 1 D0 Reset GND D2 D3 D4 D5 D6 D7 D8 D9 TX0 RX1 RST GND 2 3 4 5 6 7 8 9 BLK GRN Arduino Pro Mini **DEV-11114** Programmed as Arduino Pro Mini w/ ATmega328 8MHz/ 3.3V GND CTS VCC TXO RXI To FTDI break...

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Name Power GND Control Arduino Port ADC PWM Serial Ext Interrupt PC Interrupt Misc PCINT17 TXD PD1 ... it PB1 D1 D0 Reset GND D2 D3 D4 D5 D6 D7 D8 D9 TX0 RX1 RST GND 2 3 4 5 6 7 8 9 Arduino Pro Mini **DEV-11114** Programmed as Arduino Pro Mini w/ ATmega328 8MHz / 3.3V BLK GRN GND GND CTS VCC TXO RX... lang:nl **score:16** filesize: 545.86 K page_count: 1 document date: 0000-00-00

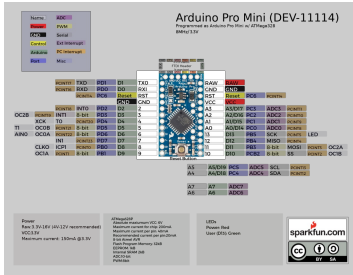


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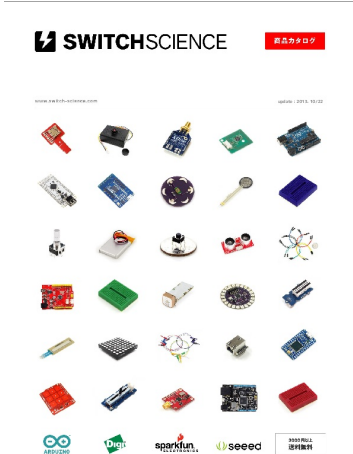
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Name Power GND Control Arduino Port ADC PWM Serial Ext Interrupt PC Interrupt
Misc PCINT17 PCINT16 ... 1 D0 Reset GND D2 D3 D4 D5 D6 D7 D8 D9 TX0 RXI
RST GND 2 3 4 5 6 7 8 9 BLK GRN Arduino Pro Mini **DEV-11114** Programmed as
Arduino Pro Mini w/ ATmega328 8MHz/ 3.3V GND CTS VCC TXO RXI To FTDI
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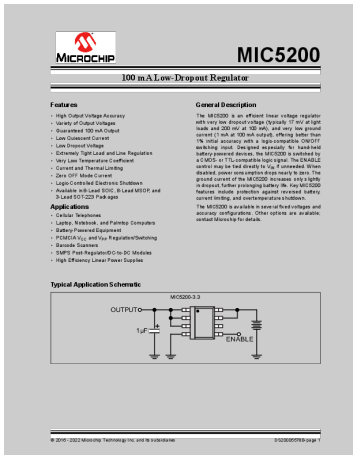


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MIC5200 100 mA Low-Dropout Regulator Features High Output Voltage Accuracy
Variety of Output Voltages Guaranteed 100 mA Output Low Quiescent Current Low
Dropout Voltage Extremely Tight Load and Line Regulation Very Low Temperature
Coefficient Current and Thermal Limiting Zero OFF Mode Curr...

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