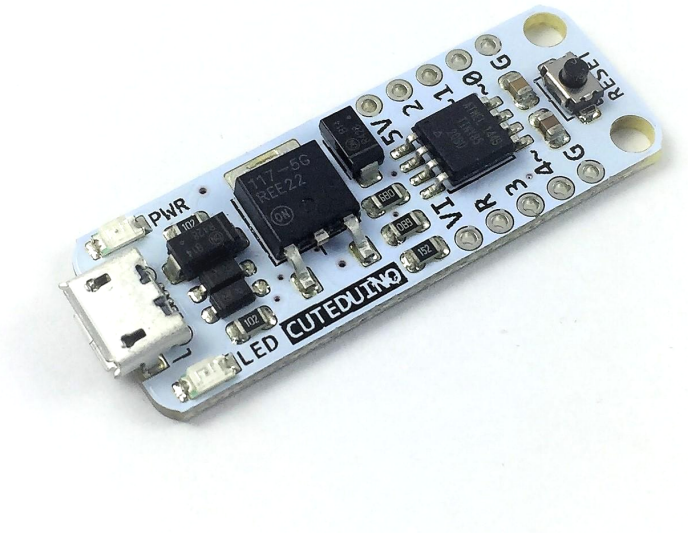
CUTEDUINO
CuteDuino



User's Manual

V1.5

June 2015

INDEX

1. INTRODUCTION

CuteDuino is an Attiny85 based microcontroller development board similar to the Arduino line, only cheaper, smaller, and a bit less powerful. With a compact yet powerful Attiny85 microcontroller and the ability to use the familiar Arduino IDE, the CuteDuino is a great way to jump into electronics, or perfect for when an Arduino is too big or too much.

It is inspired and build around the DigiSpark which uses the micronucleus bootloader. CuteDuino comes with direct USB connection which allows it to be programmed directly over a bit banged USB connection. Yup, no USB to UART bridge in between. Besides, the CuteDuino can also be used to emulate any USB 1.0 device!

The board is broken down into 10 individual pins and has 2 indication LEDs: Power and active high LED connected to pin 1 (arduino designation). It has 5 GPIO pins but **two are shared with the USB interface**. The other three pins have one analog input and two PWM outputs. The shared pins (USB) have an extra analog pin and a PWM pin which can be used if your board does not need to be USB connected to the computer after programming. This version runs on 5.0V and has an onboard voltage regulator so you can also run on a 12V supplied to the "VIN" pin. With the new Arduino IDE (v1.6.4 and above), you can install all the necessary library and example with simple import, please follow this tutorial.

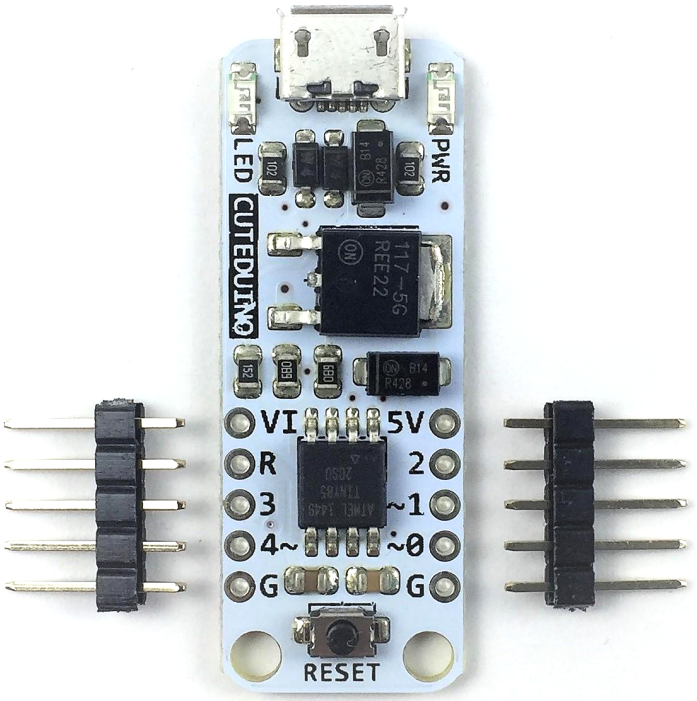
CuteDuino come with this features:

- Inspired by Digispark.
- With the new Arduino IDE v1.6.4, we have prepared the board manager URL, install CuteDuino accordingly with this tutorial.
- Power via USB or external power (7 - 12V).
- On board 5V 800mA (Max 1A) voltage regulator.
- Pre-built with micro USB receptor.
- 5 I/O pins (2 I/O shared with USB).
- 2 ADC, analog input pin (pin 2 = **A1**, pin 4 = **A2**), A2 shared with USB.
- 3 PWM output pin (pin 0, 1 and 4), pin 4 shared with USB.
- 8K flash/program memory (~6k after bootloader).
- 512 bytes of SRAM.
- 512 bytes of EEPROM.
- ATtiny85 running at 16 MHz (Internal oscillator).

- Power and programmable LED (connected to pin 1) included.
- Breadboard friendly.
- Reset button for entering the bootloader or restarting the program.

2. PACKING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.



- 1 x CuteDuino board
- 2 x 5 ways header pin

Optional (not included):

- USB Micro-B cable for program loading.

* USB Micro-B is commonly use for Android phone, you can utilize it.

3. PRODUCT SPECIFICATION AND LIMITATIONS

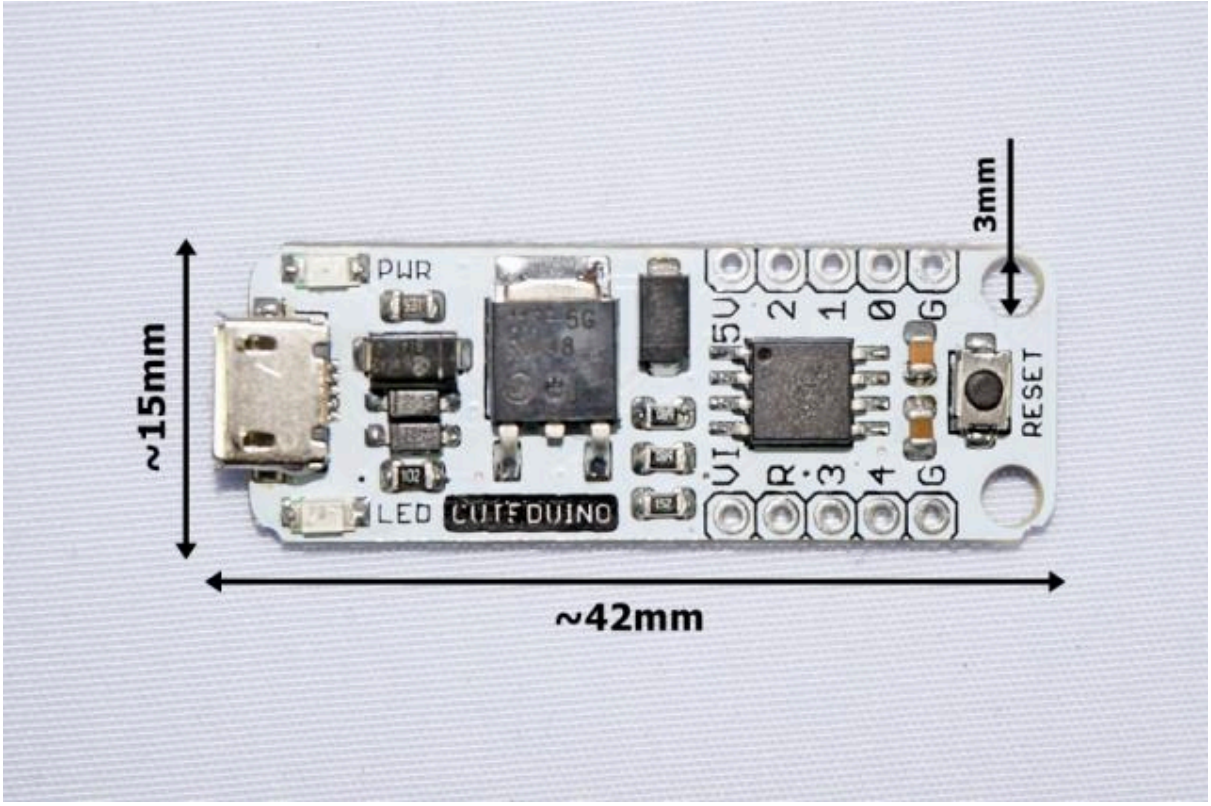
CuteDuino is designed to offer starting up platform for development, the specification of ATTINY IC used should be referred.

Absolute Maximum Rating

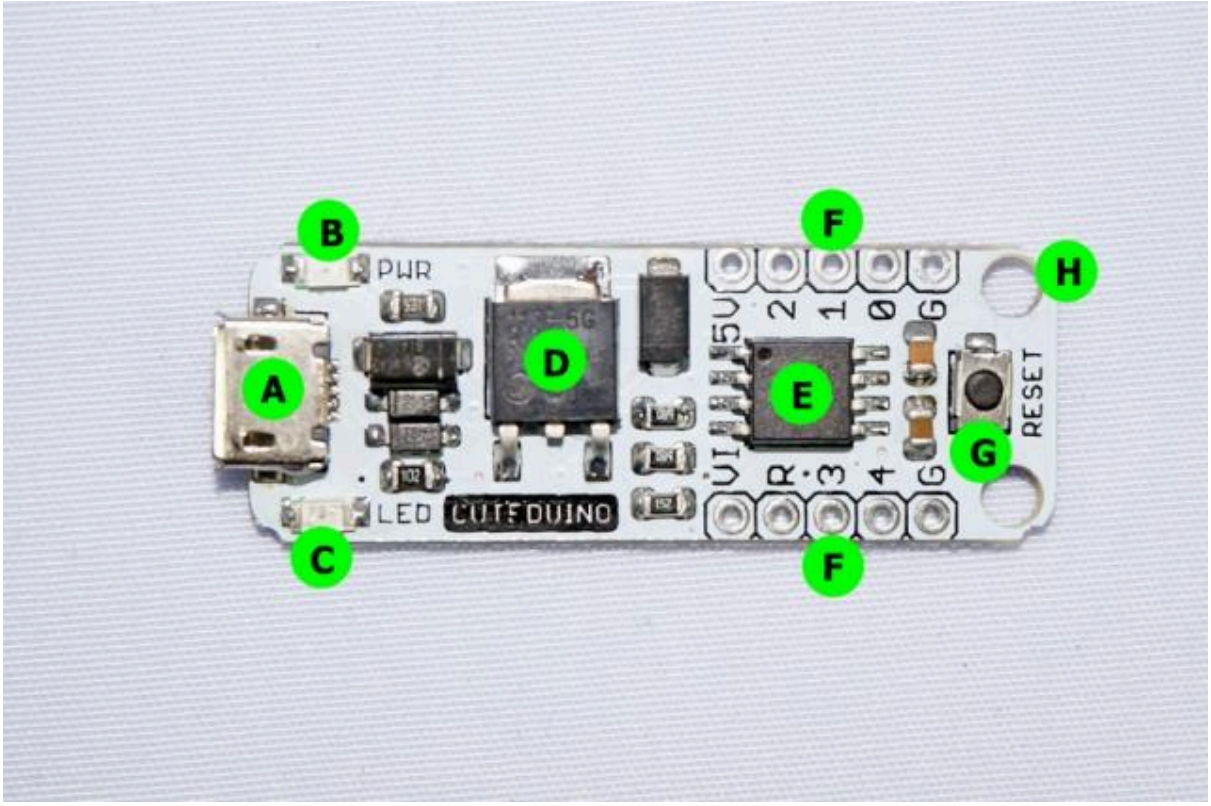
Parameter	Min	Max	Unit
Input Voltage via VI pin	7	15	V
I_{MAX} (Maximum output current from on-board 5V Voltage regulator)*	-	1	A

* With Vin at 12V

4. DIMENSION



5. BOARD LAYOUT



Label	Function
A	Micro USB B type (female)
B	Power indicator LED
C	Programmable LED (connected to Pin 1, active high)
D	5V voltage regulator
E	ATtiny85
F	Pad for header pin
G	Reset button
H	3mm hole

Micro USB B type (female)
This connector is for USB connection to upload program or power it via USB cable. A USB Micro-B type cable is needed.

Power LED
Power LED will light ON once the board is powered.

Programmable LED
Programmable LED is active HIGH and it is connected to pin 1 (Arduino designation).

5V voltage regulator
This type of voltage regulator can handle up to 1A maximum.

ATtiny85
CuteDuino uses ATtiny85 as main controller running at 16MHz internal oscillator.

Pads for header pin
CuteDuino pins can be extended to breadboard by soldering the header pin to these pads.

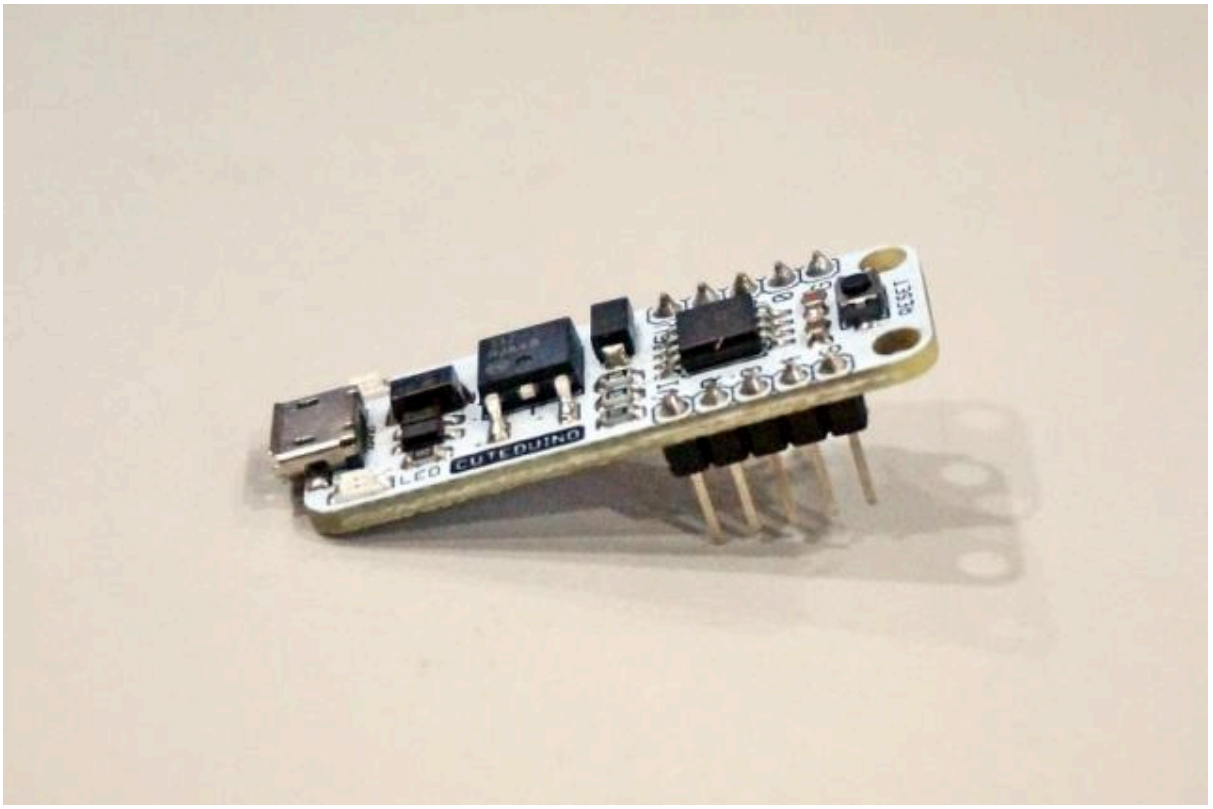
Reset button
Reset button can be used to enter bootloader mode or restart program.

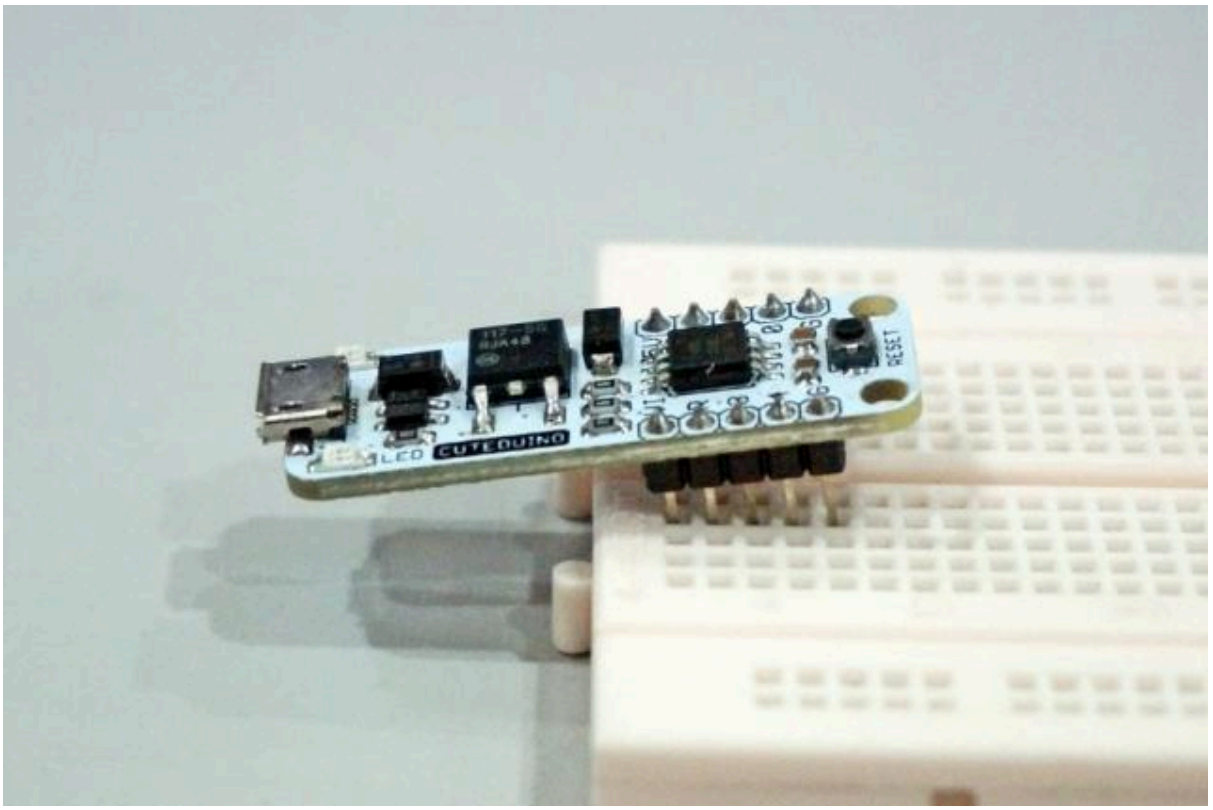
3mm hole
This hole can fit standard PCB stand.

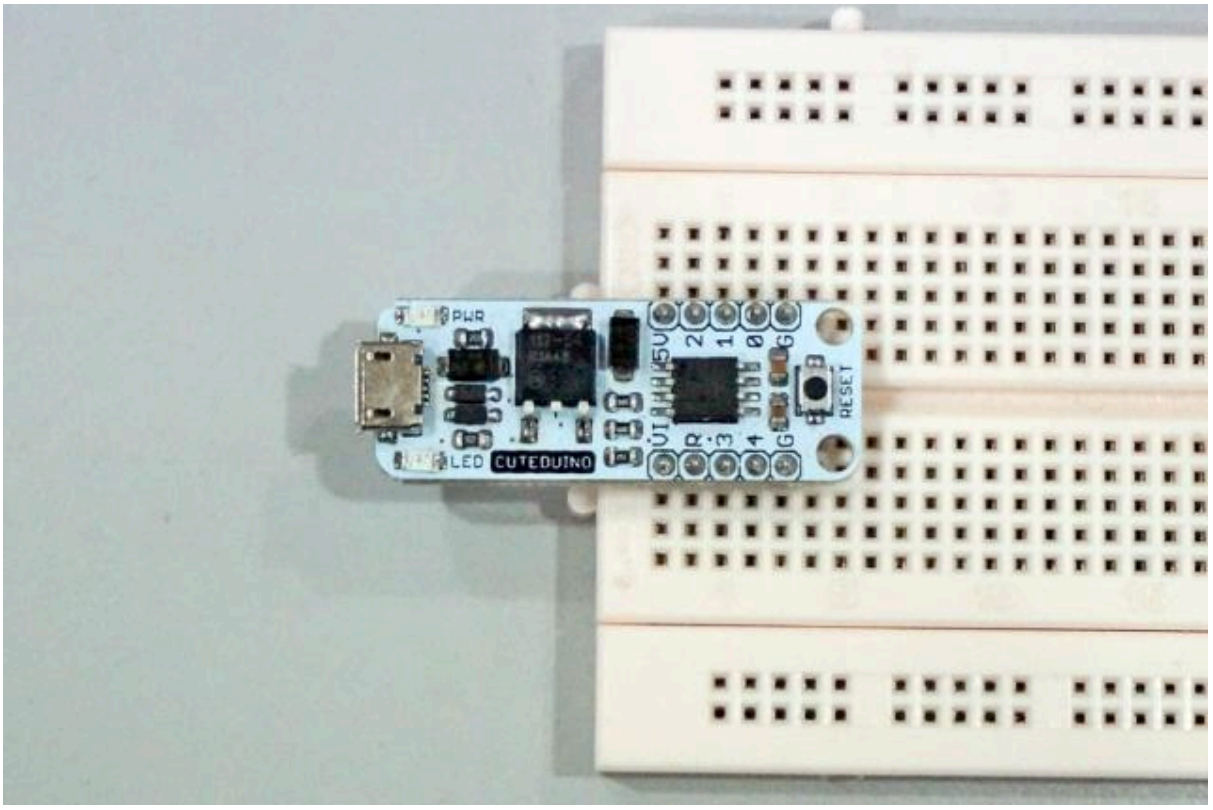
6. HARDWARE INSTALLATION

6.1 CuteDuino I/O pins

CuteDuino comes with 2 x 5 header pin. User may solder it and plug CuteDuino onto breadboard to utilize the I/O of CuteDuino. Figures below shows the example of CuteDuino with header pins and insert onto breadboard.







7. GETTING STARTED

This section will guide user to get started with CuteDuino. There are two parts which are "Installing CuteDuino USB Driver" and "Program CuteDuino with Arduino IDE". For further information can refer to this link.

7.1 Installing CuteDuino USB Driver

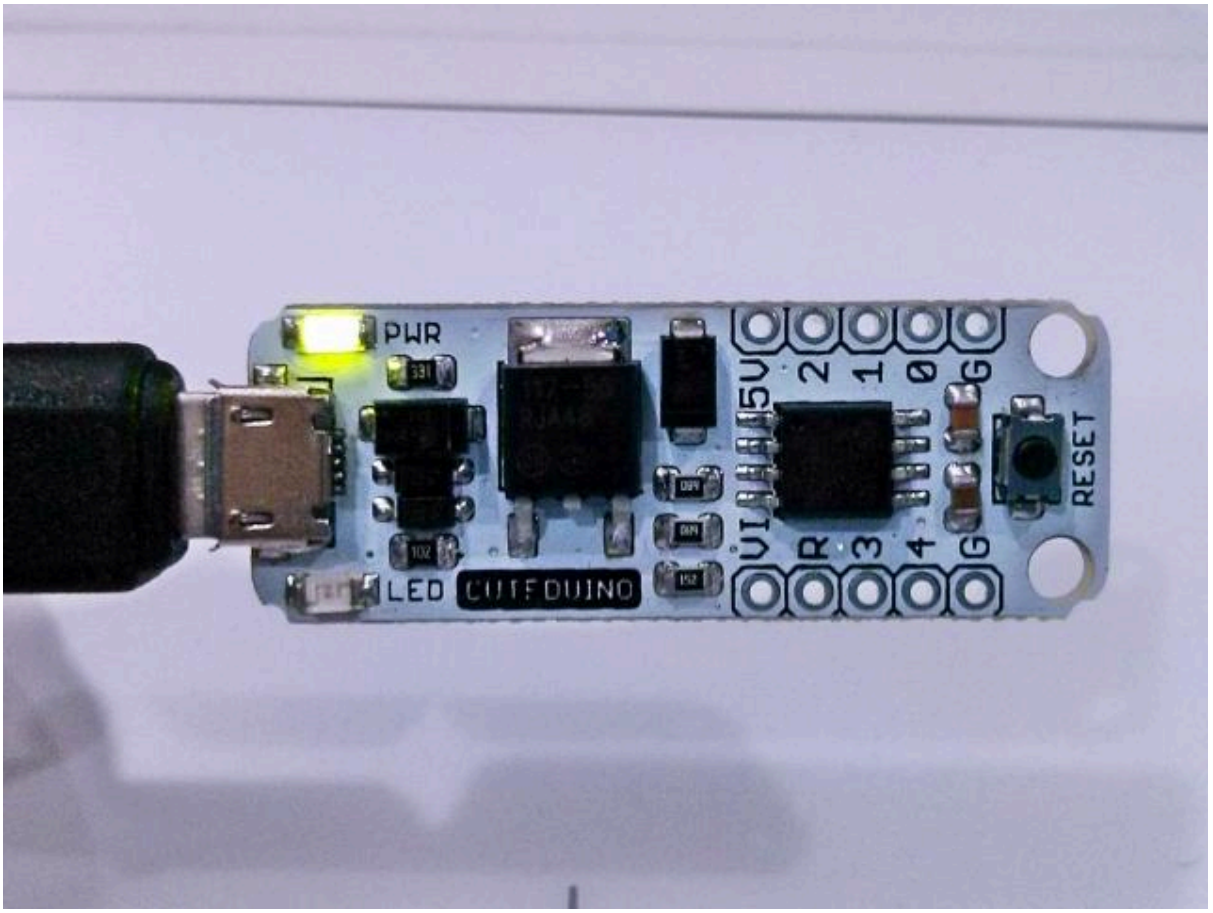
Download the Digispark package which include the open source Arduino IDE (v1.5.8C) Digispark Addons and Digispark driver. Double click the files to execute it. It will extract the necessary files and install the USB driver. Easy!

Alternatively, if you want to download the driver only, please download from CuteDuino Github folder. Extract to the zip file.

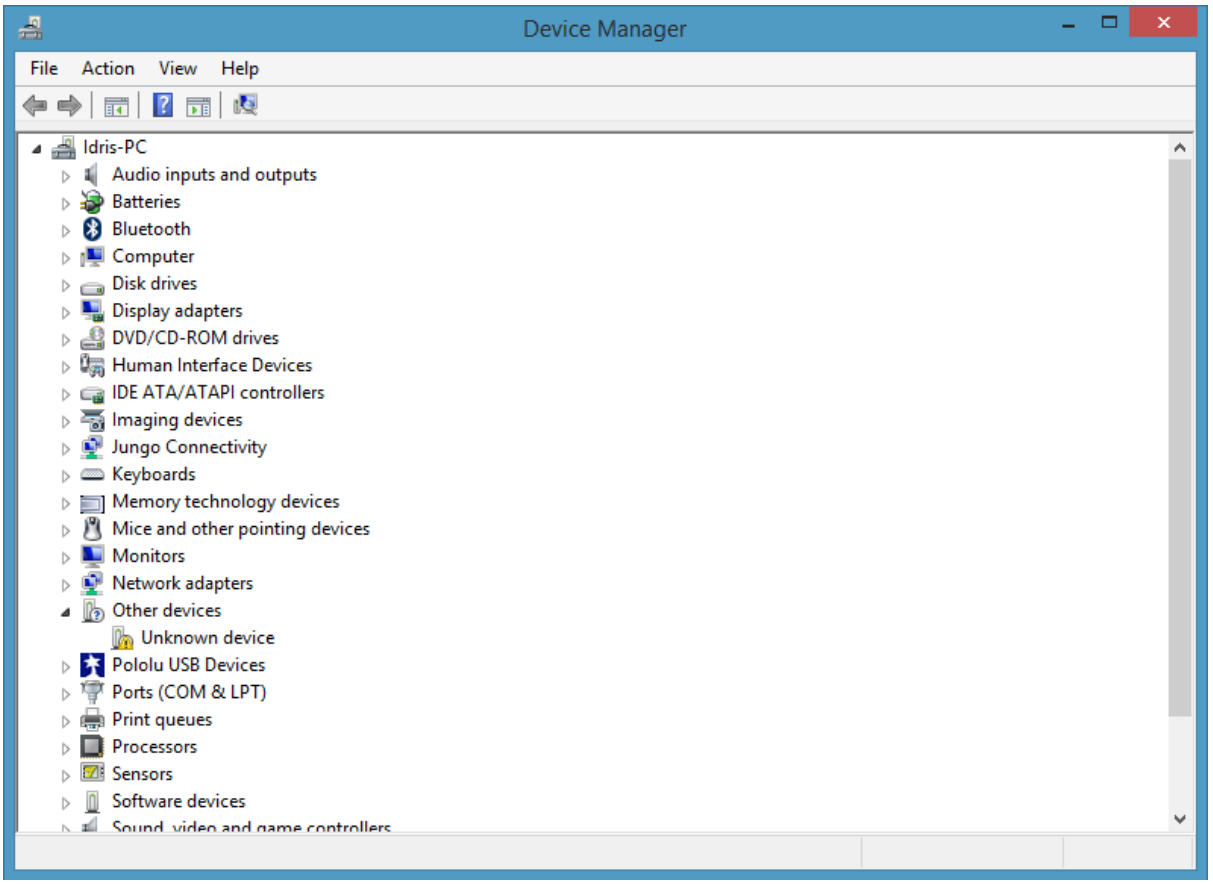
1. **DigisparkWindowsDriver**

NOTE:
*For Windows 8, user might need to **disable** the "**driver signature enforcement**" before proceed with the driver installation.

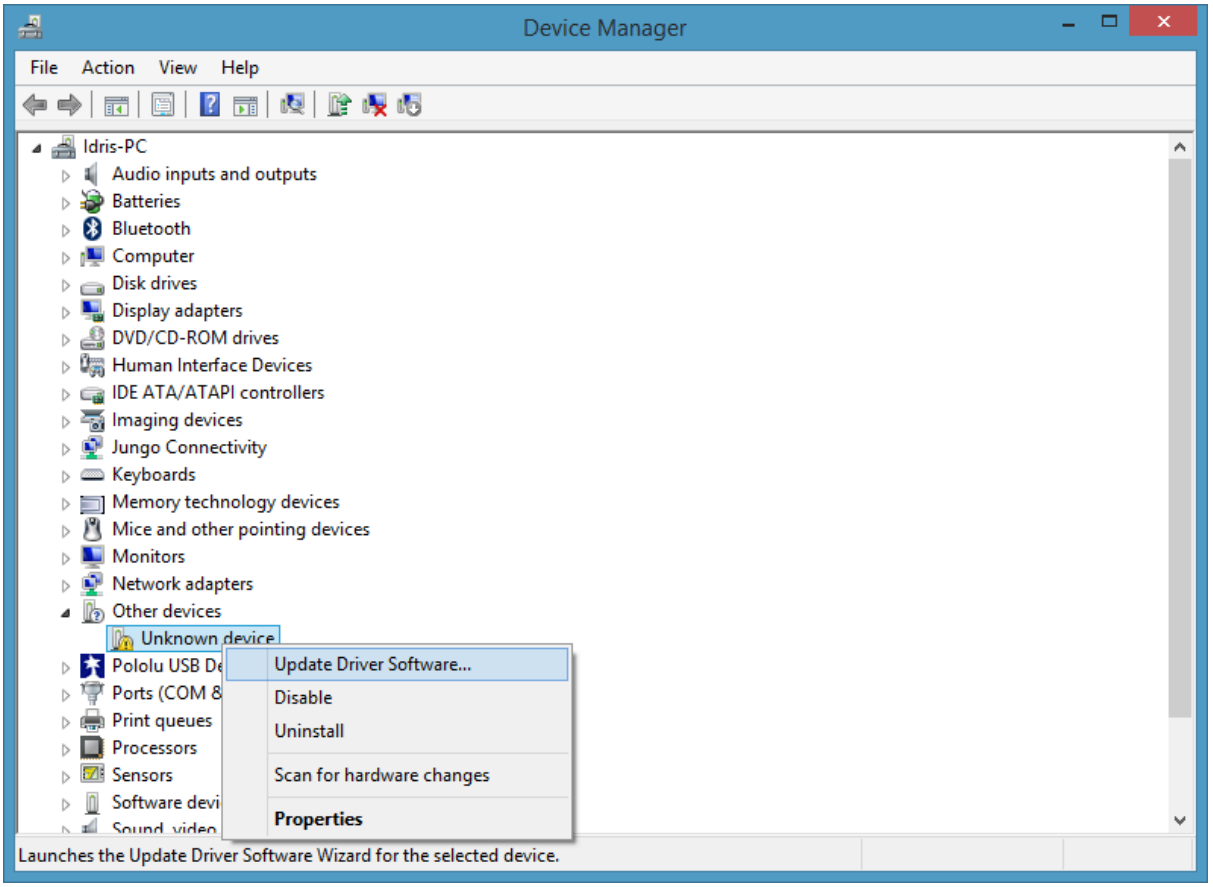
Using Micro-B USB cable, connect CuteDuino to computer. Once connected, the PWR LED will turn ON.



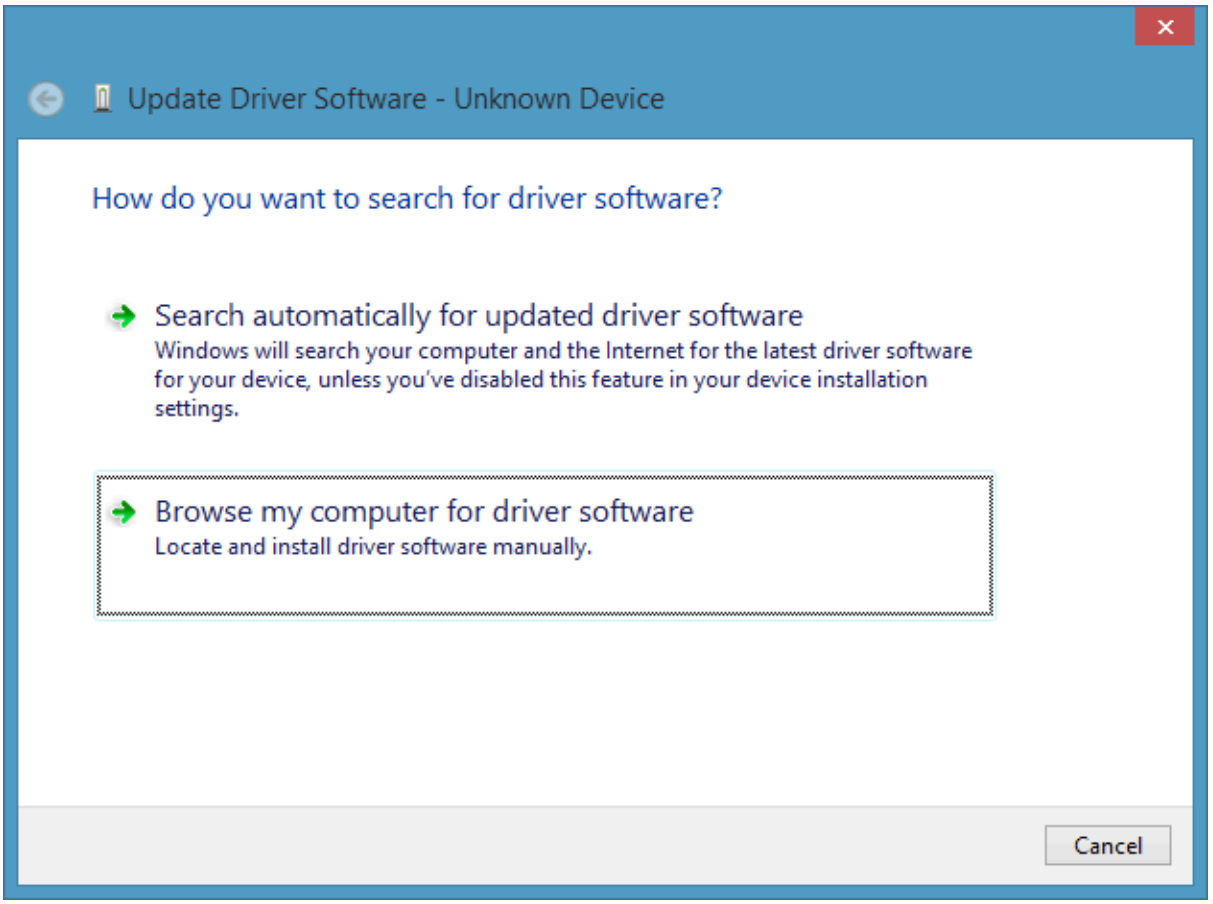
For the first time connection, computer will not recognize CuteDuino (Unknown device).



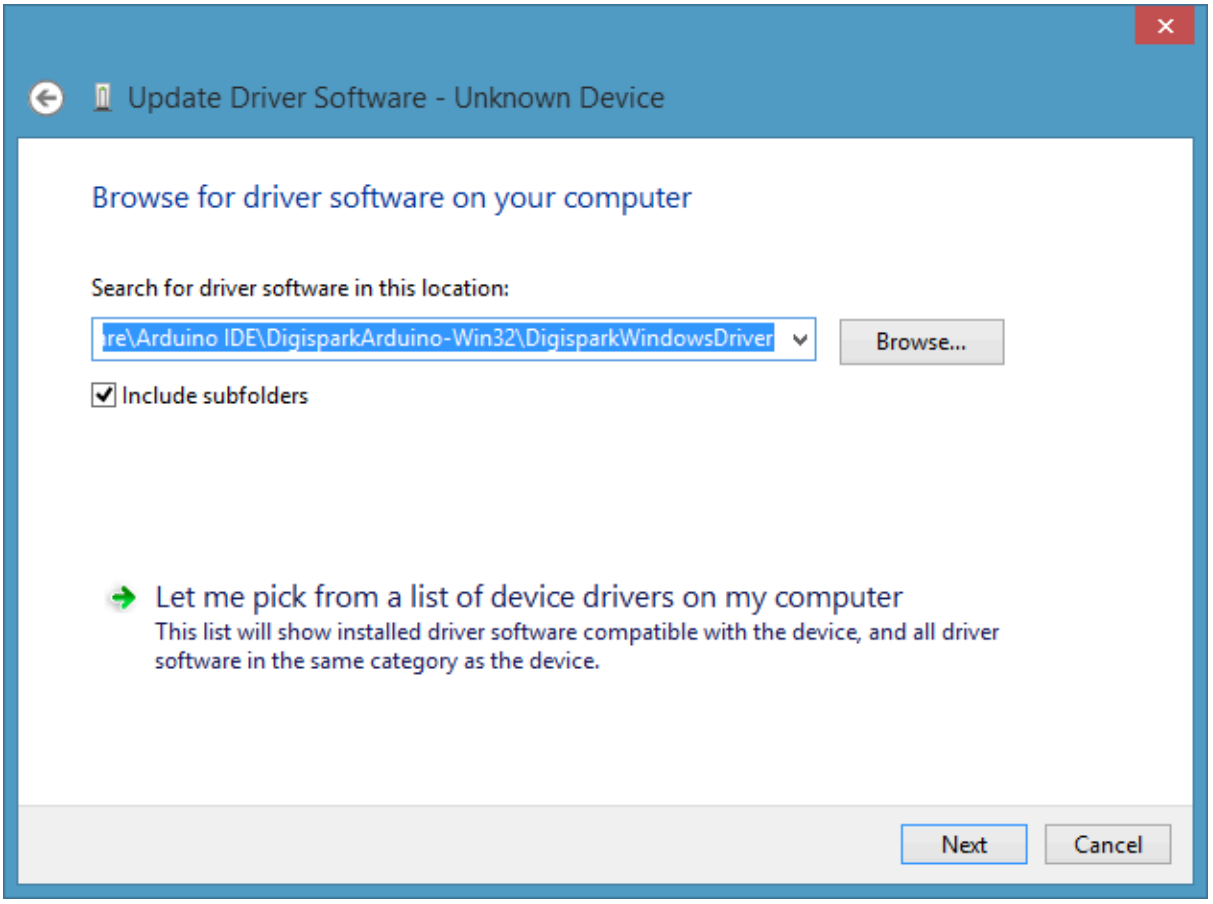
Right click on Unknown device (CuteDuino), choose **Update Driver Software...**



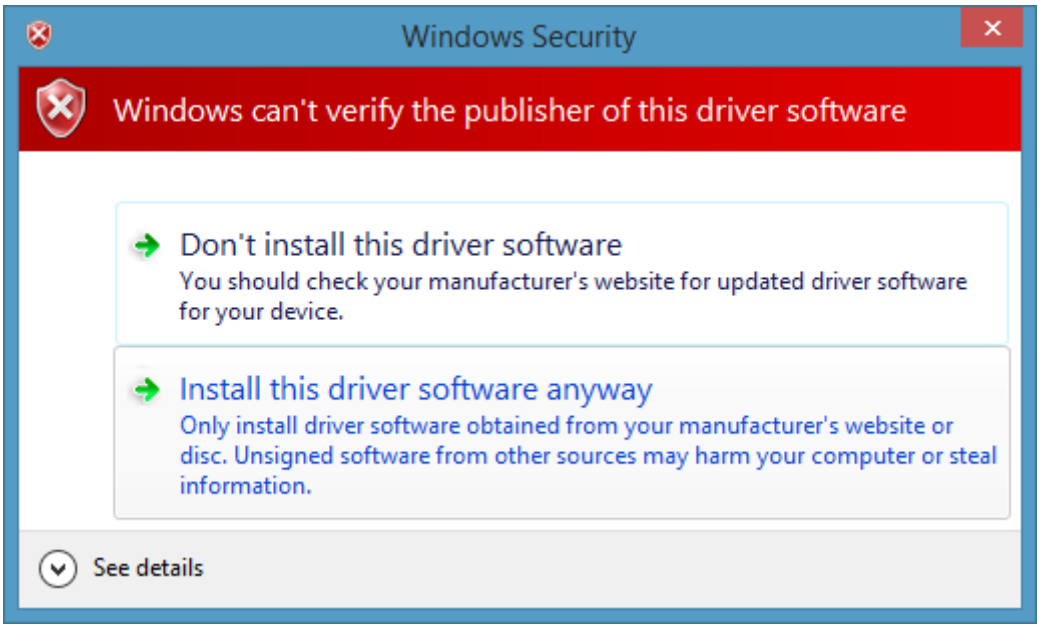
Choose **Browse my computer for driver software**.



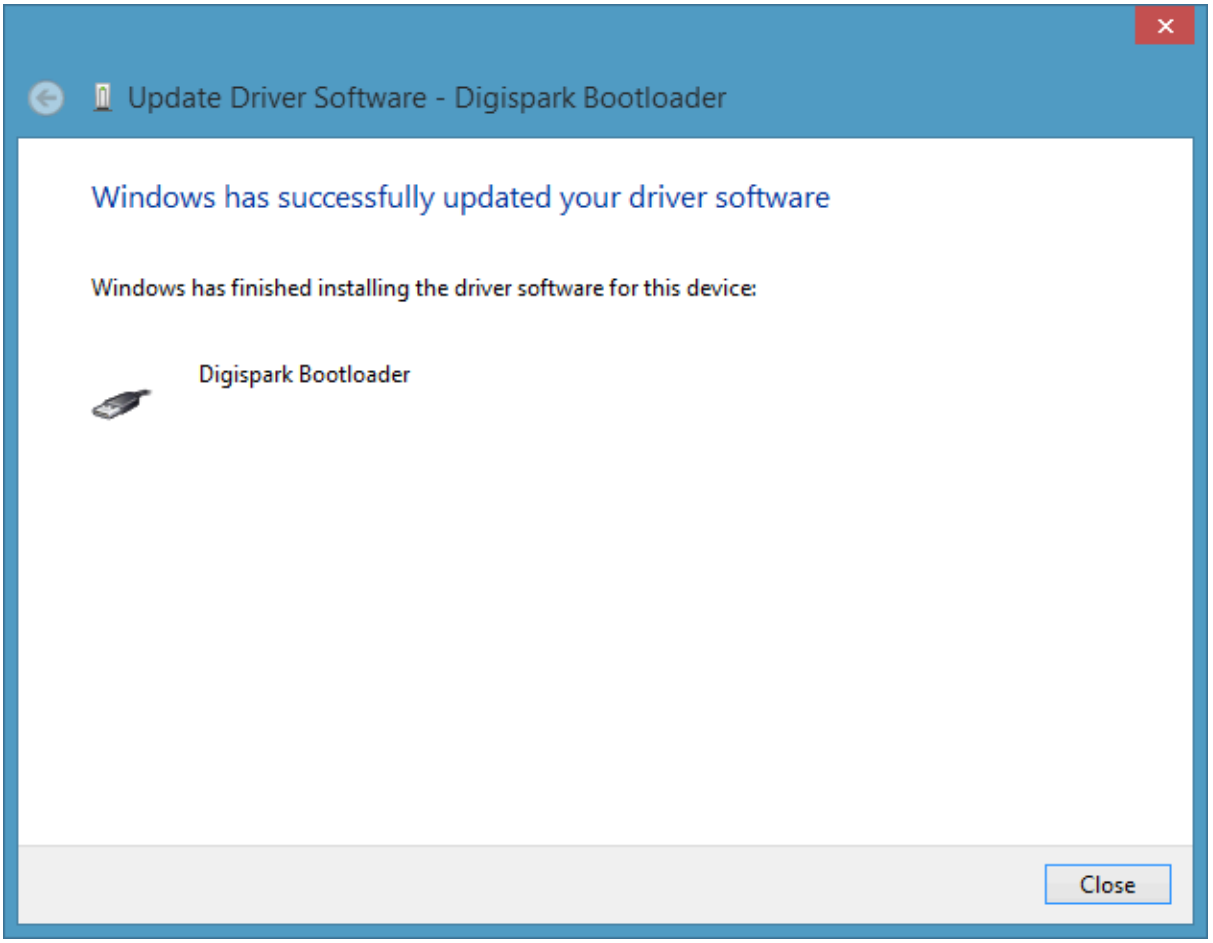
Click **Browse…** and point to the **DigisparkWindowsDriver** folder. Click **Next**.

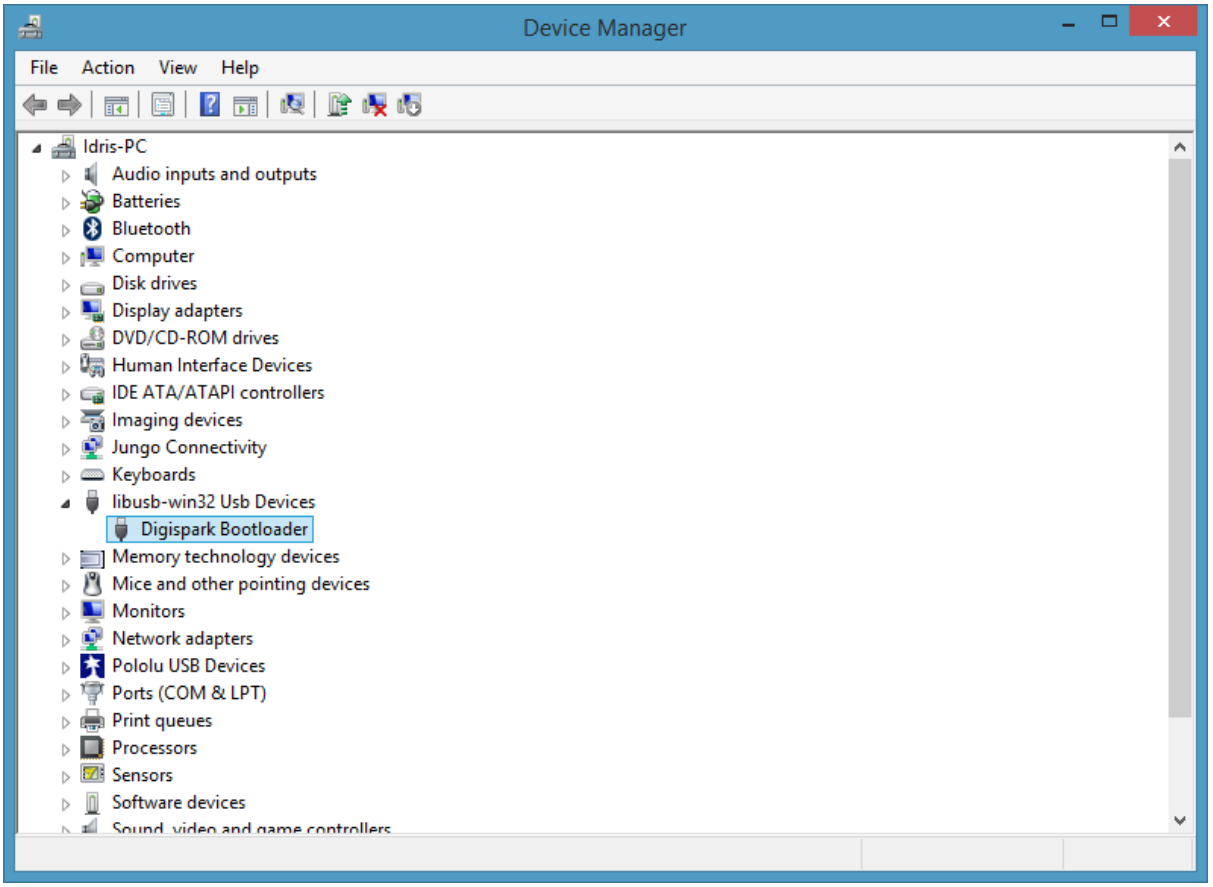


Windows Security will popup, choose **Install driver software anyway**. Reminder, for Windows 8 user, if **driver signature enforcement** is not disable, Windows Security will not popup and driver installation will not succeed.



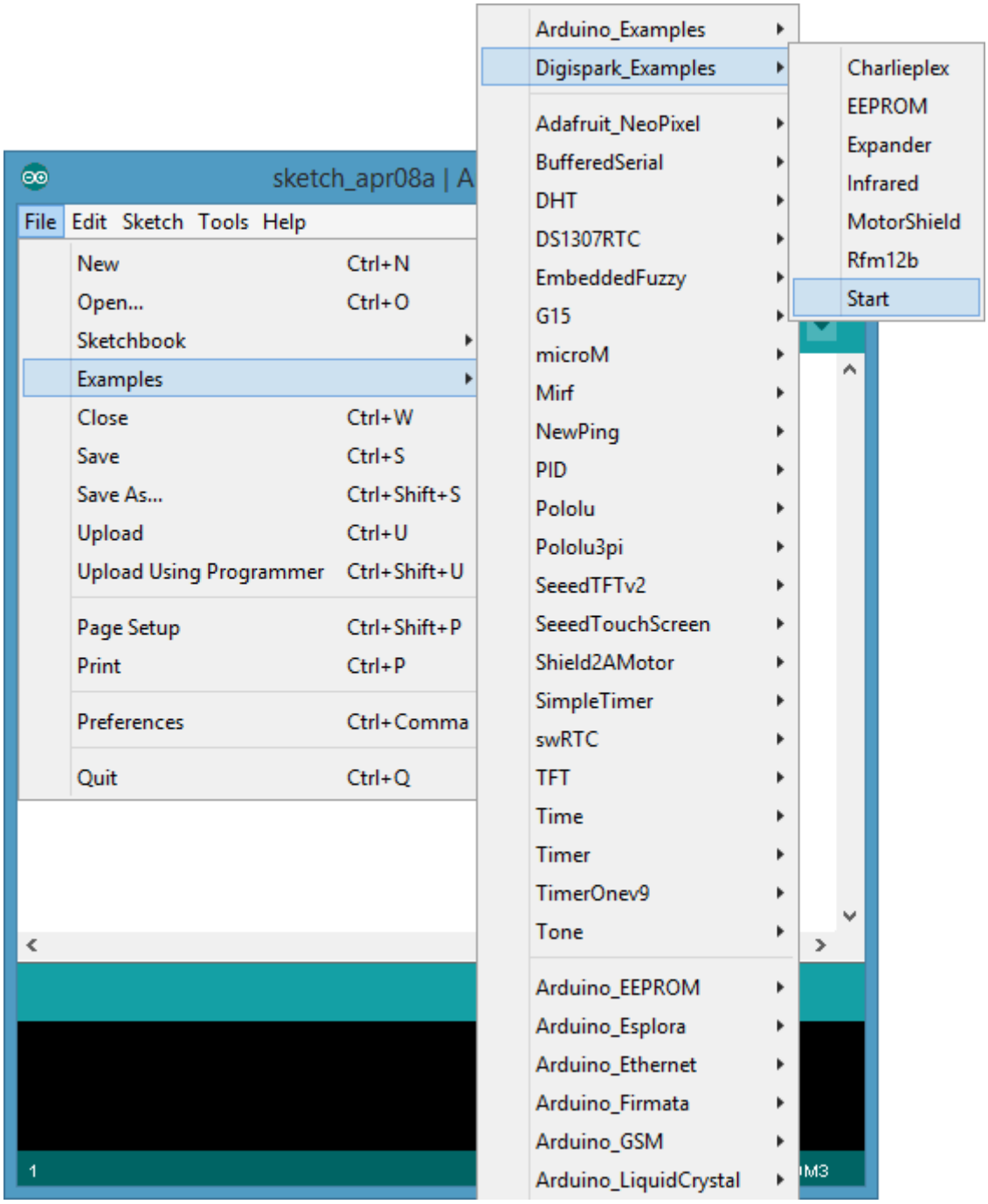
Windows has successfully updated your driver software.



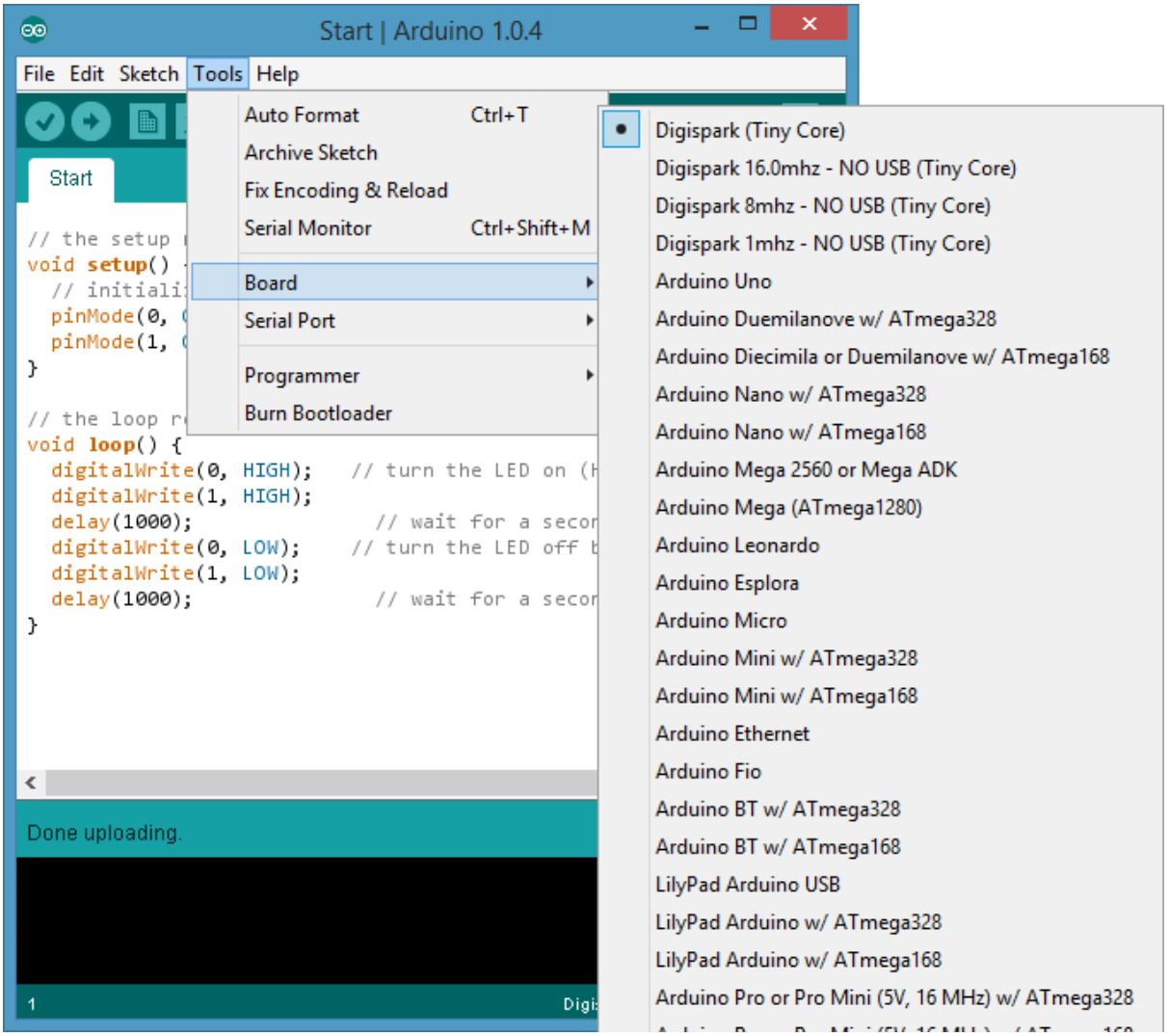


7.2 Program CuteDuino with Arduino IDE

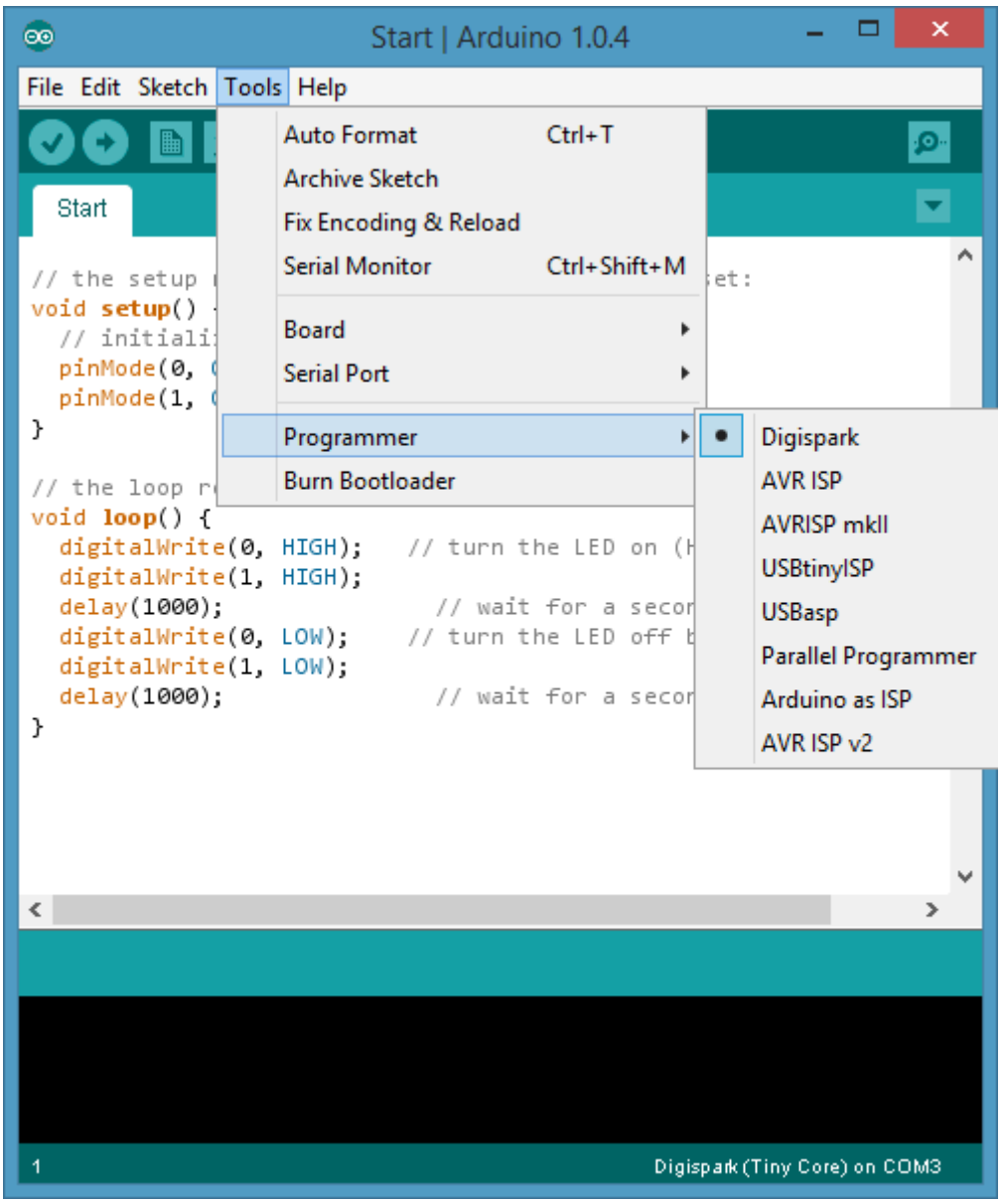
If you download the Arduino IDE from DigiSpark, open Arduino IDE inside **Digispark-Arduino-1.5.8** folder. Just ignore/click No if they request for software update. Open Digispark example code, go to **File - Examples - Digispark_Examples - Start**.



Since CuteDuino use Digispark bootloader, we need to select **Digispark (Tiny Core)** as Arduino **Board**.



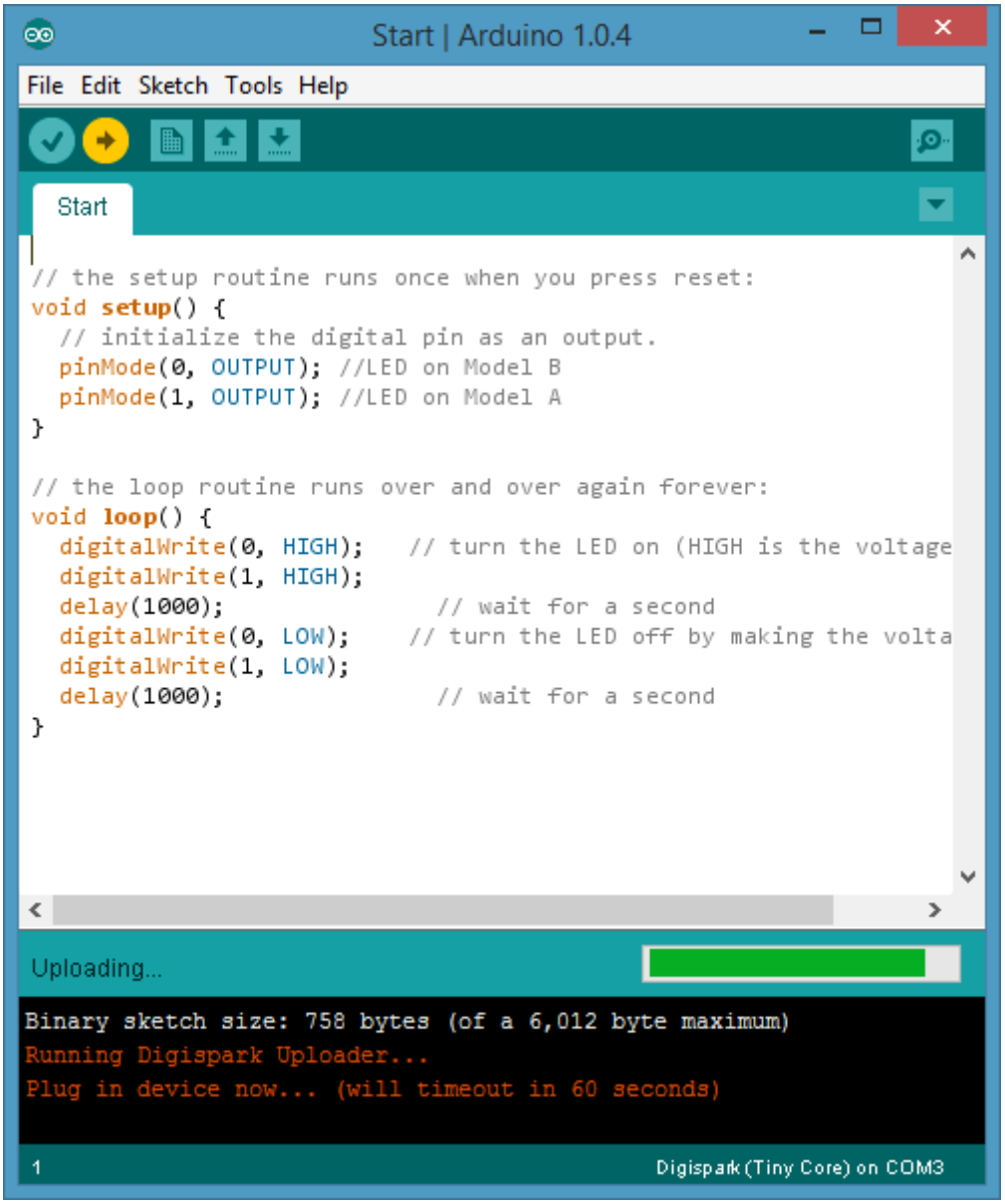
Choose **Digispark** as **Programmer**.



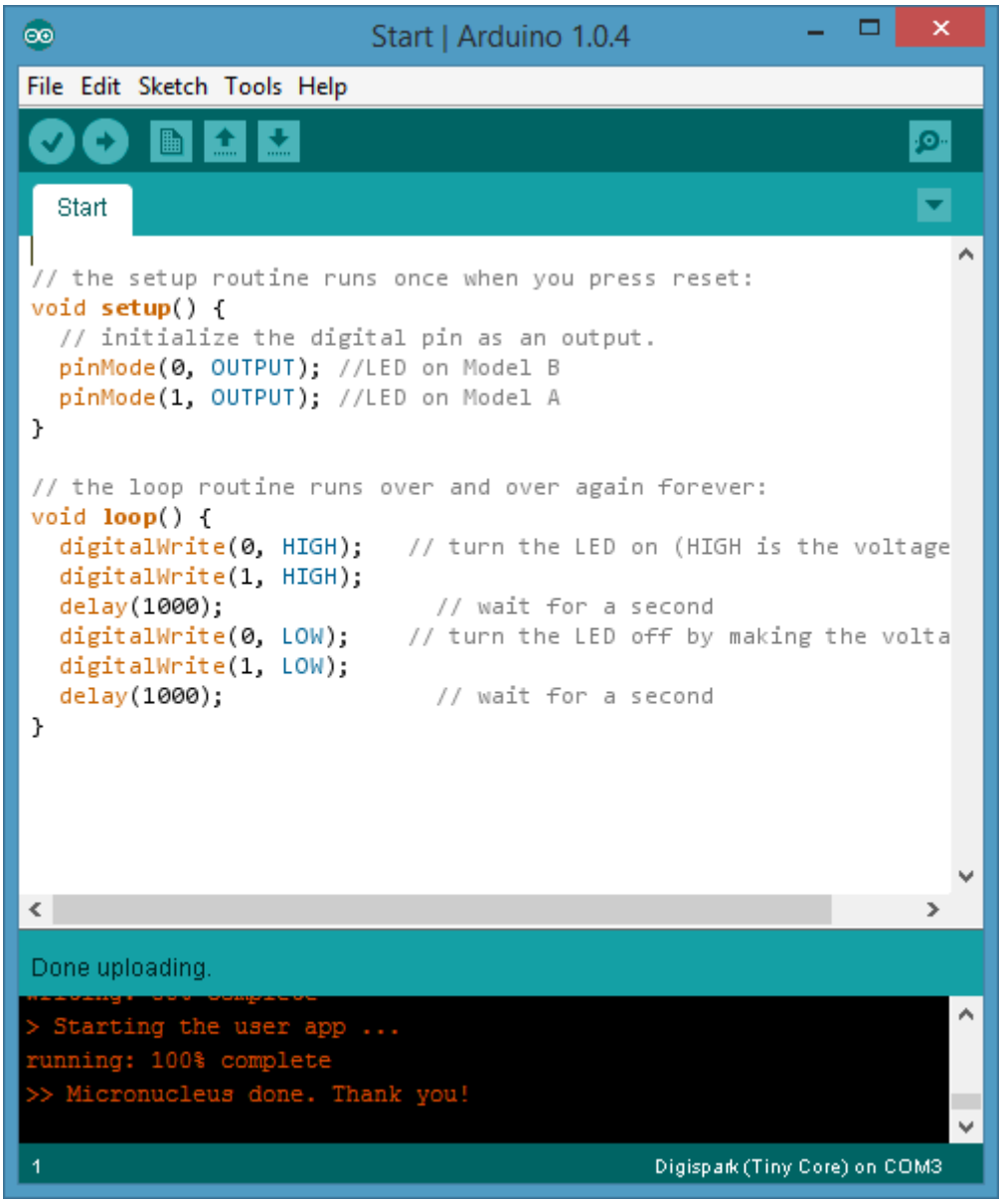
If you are using Arduino IDE v1.6.4, you can simply install CuteDuino board via Arduino 3rd party boards URL, check this tutorial.

***IMPORTANT**

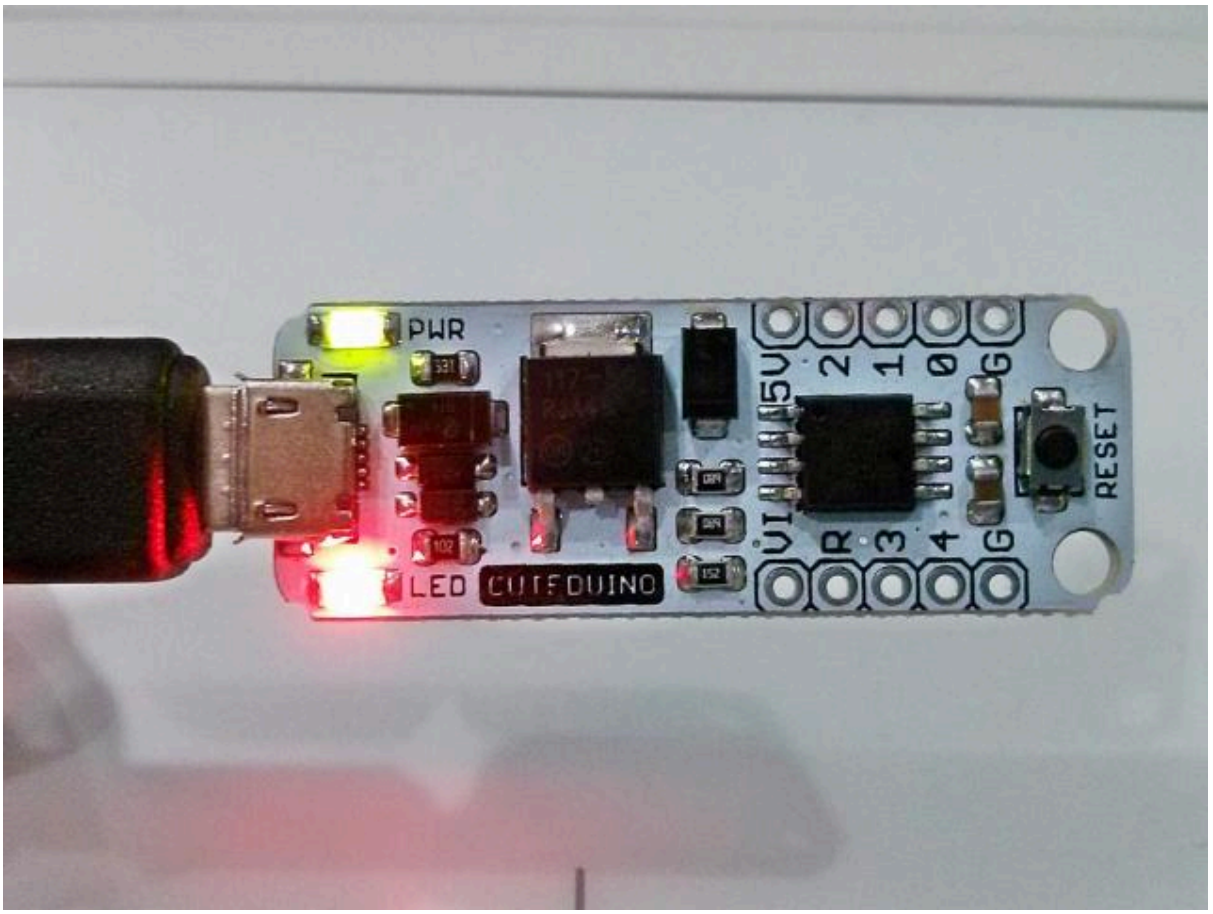
Click upload button (right arrow) to upload the code into CuteDuino. For the **first time** upload, pressing reset button is not necessary. For **second time and afterwards**, when reach to this state (`Running digispark uploader... Plug in device now... (will timeout in 60 seconds)`), please press reset button (press and release) once and wait until upload is complete.



Upload is succeed.



Programmable LED at CuteDuino should blink right now.



8. WARRANTY

- Product warranty is valid for 12 months.
- Warranty only applies to manufacturing defect.
- Damaged caused by misuse is not covered under warranty
- Warranty does not cover freight cost for both ways.

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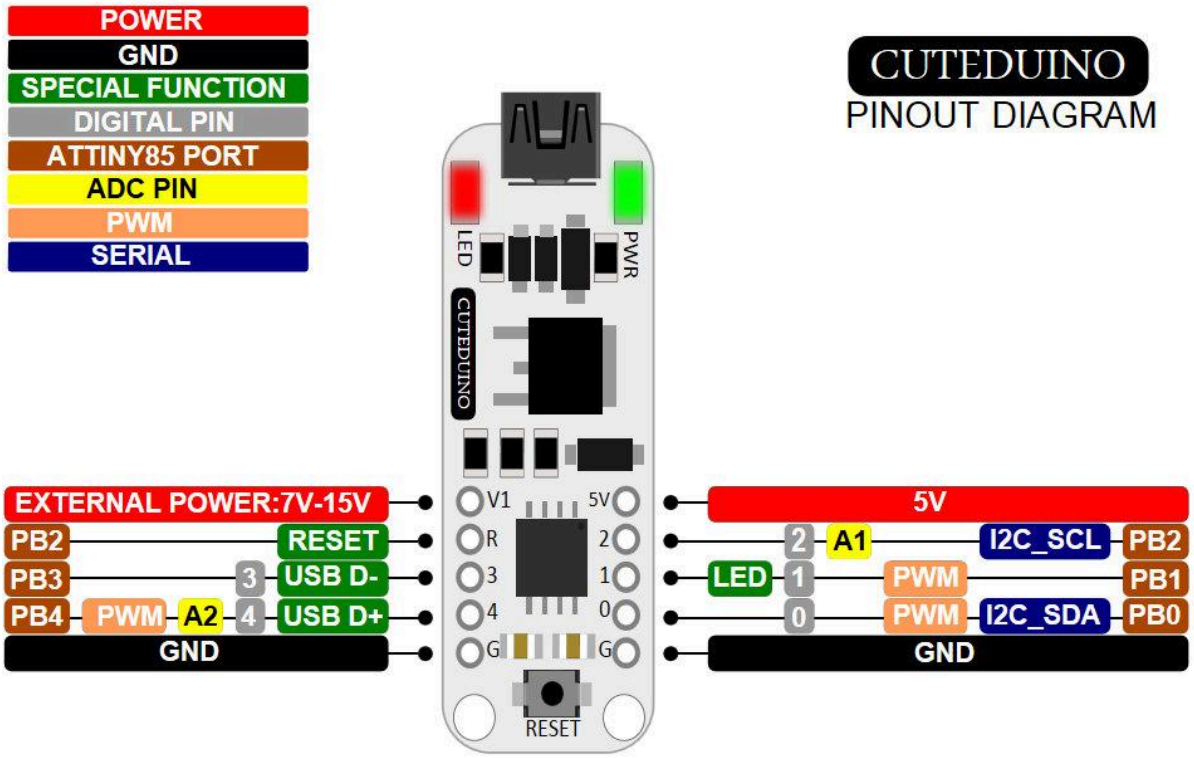
9. Appendix A: CuteDuino's Pinout Diagram



10. Appendix B: FAQ of CuteDuino

1. Who design and manufacture CuteDuino?

Cytron Technologies design and manufacture CuteDuino (design inspired by DigiSpark).

2. Is CuteDuino compatible with Arduino?

Yes, CuteDuino is compatible with Arduino as you can utilize Arduino library and Arduino IDE to write sketches and load into it. But it is not official Arduino main such as Arduino UNO or Leonardo.

3. What is the difference between CuteDuino vs DigiSpark?
   - CuteDuino is inspired by DigiSpark.
   - CuteDuino utilize USB microB (Android phone cable) vs DigiSpark USB A type connector.
   - CuteDuino arranges the pin in two roles at side to make it breadboard friendly.
   - CuteDuino has on-board Reset button, allowing board reset for program loading; while DigiSpark does not have reset button, so every program loading require unplug and plug into USB port.
   - With CuteDuino's Reset button, it has one I/O pin lesser vs DigiSpark. CuteDuino has only 5 I/O pins, from pin 0 to 4, there is no pin 5.
   - Do check the CuteDuino diagram in Appendix A.
4. CuteDuino vs Arduino UNO?

CuteDuino is using ATtiny85 vs Atmega328 on Arduino UNO. There are many difference in this.

- CuteDuino has only 8K memory (~6K after bootloader) vs 32K (~31.5K after bootloader) on Arduino UNO.
- CuteDuino has less IO and peripherals vs Arduino UNO.
- Most of commonly used library works on CuteDuino, but not all.
- There is no hardware UART (Serial) nor hardware USB to UART converter on CuteDuino, so you cannot utilize Serial Monitor on Arduino IDE. But CuteDuino can always utilize software serial for UART communication and there is DigiUSB library to offer serial monitor alike example.

5. Which version of Arduino IDE can program CuteDuino?

Yes!! Originally, DigiSpark uses modified version of Arduino IDE v1.5.8. But since Arduino IDE v1.6.4 allow easy insert of 3rd party board via URLs, we have prepare the data in URL and tutorial to get your Arduino IDE ready for CuteDuino. Don't forget to

install the USB driver.

6. What is the microcontroller used on CuteDuino?

   Attiny85

7. How many digital pin on CuteDuino?

   CuteDuino has 5 digital I/O pins, 0, 1, 2, 3, 4. Please refer to the CuteDuino pin diagram. Please be caution when pin 3 and 4 as these two pins shared with USB and pin 3 is pull up with 1.5K ohm resistor to 5V. Using these 2 pins might affect the intended function, and USB program loading will most likely affected too.

8. How many Analog input (ADC) on CuteDuino?
   - Two Analog inputs, pin 2 is A1 (ADC channel 1) while pin 4 is A2 (ADC channel 2). Pin 4 (A2) is shared with USB pin, it might affect the program loading if ADC voltage is too low or high.
   - Pin 3 is also ADC input pin, but because it is pull-up to 5V via 1.5K ohm resistor, it is not recommended to use as ADC input.
   - Reset pin is another ADC input, but since is it configured as Reset pin, it is not recommended as ADC input.
9. How many PWM output on CuteDuino?

   Three PWM pins, pin 0, 1 and 4 can be programmed to generate PWM output using AnalogWrite() function. Pin 4 is shared with USB pin.

10. Can CuteDuino utilize UART, I2C or SPI communication?
    - CuteDuino does not have hardware serial port (UART), but you can always use software serial (#include <SoftwareSerial.h>) in your sketch.
    - CuteDuino has I^2C lines, pin 0 is data/SDA, pin 2 is clock/SCL.
    - As for SPI, you will need to utilize USI (Universal Serial Interface).
11. Can CuteDuino use Serial.begin(9600) and send data to Arduino Serial Monitor?

    Nop, you cannot utilize Serial.begin() or hardware serial as CuteDuino does not have hardware serial port. Instead you can utilize softserial (#include <SoftwareSerial.h>) in your sketch.

    To send communicate with computer, CuteDuino does not have USB to UART converter

so you can explore DigiUSB.

12. Is CuteDuino compatible with Gemma?

Hardware (circuit) are compatible, but the bootloader is not. So if you could reprogram CuteDuino with Gemma bootloader, you get a Gemma. We have tutorial showing how to do it.

13. Can I load Gemma bootloader into CuteDuino and use it as Gemma?

From hardware point of view, yes, you can and we have tutorial to do it. But from license point of view, we are not sure :)

14. I cannot load program into CuteDuino, why?

Please check:

- Did you install the driver?
- Did you press reset button when Arduino IDE display "`Running digispark uploader... Plug in device now... (will timeout in 60 seconds)`" ?
- Are there any components, sensors, LEDs, etc connected to **pin 3 or 4**? Please remove it during program loading.
- Did you choose 'cuteduino" under Tools -> Boards and Programmer?
- Did you use the modified Arduino IDE or install Cytron Arduino Board URL correctly?

15. Any special limitation on CuteDuino vs Arduino UNO?

Of course. CuteDuino has ~6KB of memory only, limited IO pins, ADC input, timers and some of the library is not compatible with Arduino UNO. But do not under estimate the capability of CuteDuino :)

16. What is the operating frequency on CuteDuino?

When it is connected to USB during program loading, it will calibrate with USB signal and run at 16.5MHz. However, when it is power up without USB connection, the clock speed is near to 16MHz.

17. Where is the LED connected?

The LED is connected to pin 1 of CuteDuino.

