FUNDAMENTOS DE IOT

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Encuentro 1

Fabián Ramírez

framirez@vates.com

CONTENIDOS

- Conceptos de electrónica
- Tipos de sensores y actuadores
- Arduino
- Prácticas con Arduino

CONCEPTOS DE ELECTRÓNICA

- Hardware-101: https://developer.android.com/things/hardware/hardw
  101.html

POWER SUPPLY

- V_{IN}
- V_{CC} o V_{DD}
- Ground o Tierra (GND)

ENTRADAS Y SALIDAS DIGITALES

- Niveles TTL (5V)
- Niveles CMOS (3.3V)

VALORES LÓGICOS

- High (> 2.0V)
- Low (< 0.8V)

ENTRADAS Y SALIDAS ANALÓGICAS

- ADC (Analog to Digital Converter)
- DAC (Digital to Analog Converter)

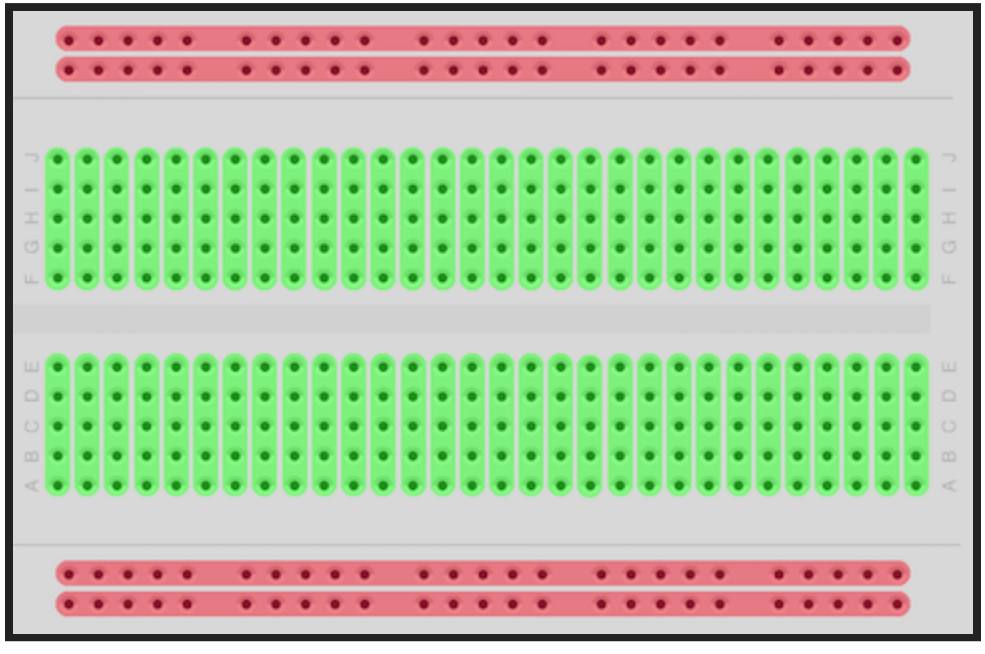
RESOLUCIÓN

- 10 bit ADC (2^{10} valores entre 0 y 1023)

ACONDICIONAMIENTO DE SEÑALES

- Amplificación
- Filtrado
- Offset

BREADBOARDS



TIPOS DE SENSORES Y ACTUADORES

http://www.electronics-tutorials.ws/io/io_1.html

Quantity being Measured	Input Device (Sensor)	Output Device (Actuator)
Light Level	Light Dependant Resistor (LDR) Photodiode Photo-transistor Solar Cell	Lights & Lamps LED's & Displays Fibre Optics
Temperature	Thermocouple Thermistor Thermostat Resistive Temperature Detectors	Heater Fan
Force/Pressure	Strain Gauge Pressure Switch Load Cells	Lifts & Jacks Electromagnet Vibration

Position	Potentiometer Encoders Reflective/Slotted Opto-switch LVDT	Motor Solenoid Panel Meters
Speed	Tacho-generator Reflective/Slotted Opto-coupler Doppler Effect Sensors	AC and DC Motors Stepper Motor Brake
Sound	Carbon Microphone Piezo-electric Crystal	Bell Buzzer Loudspeaker

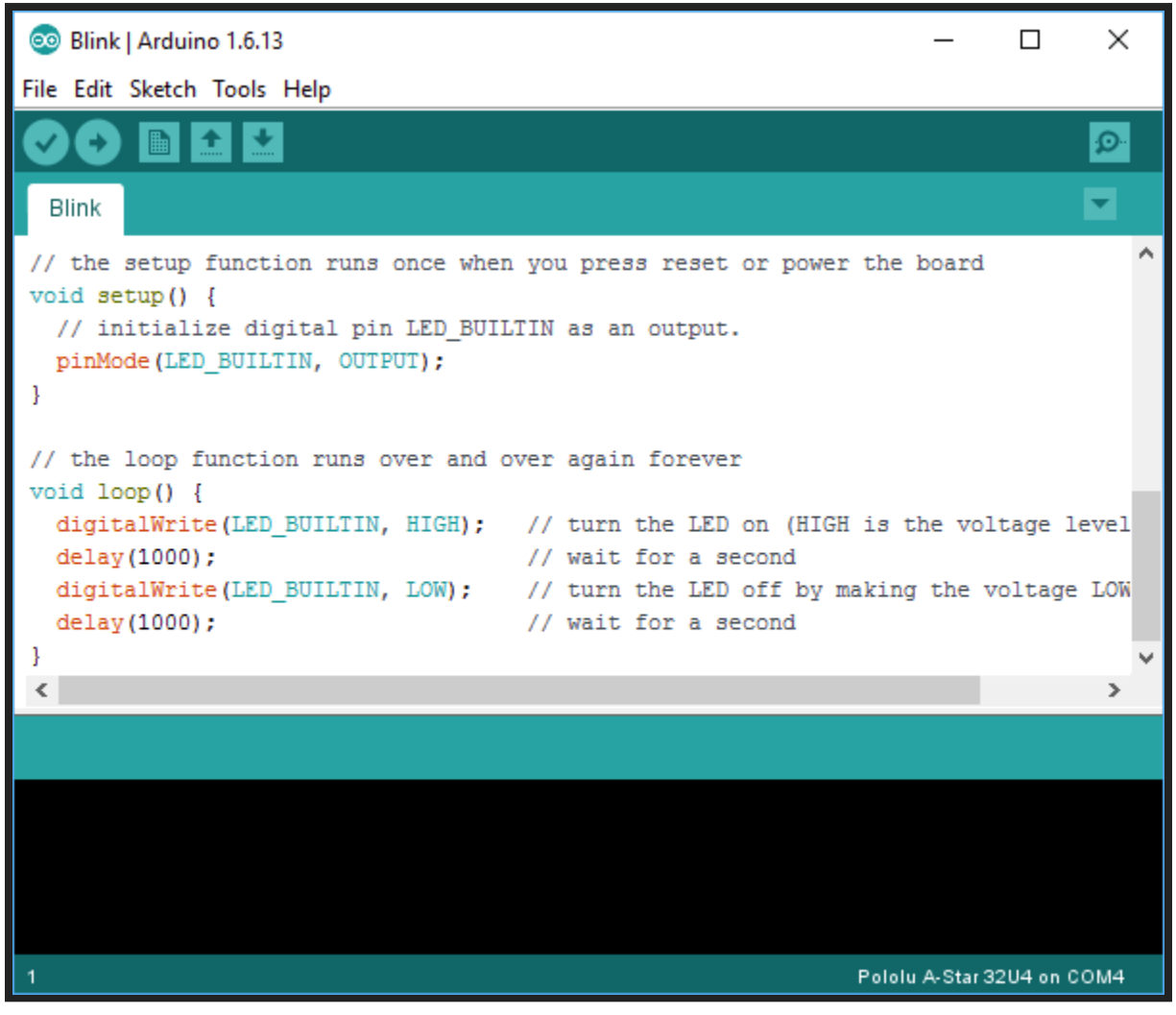
ARDUINO

https://www.arduino.cc/

- Open Hardware
- Open Software

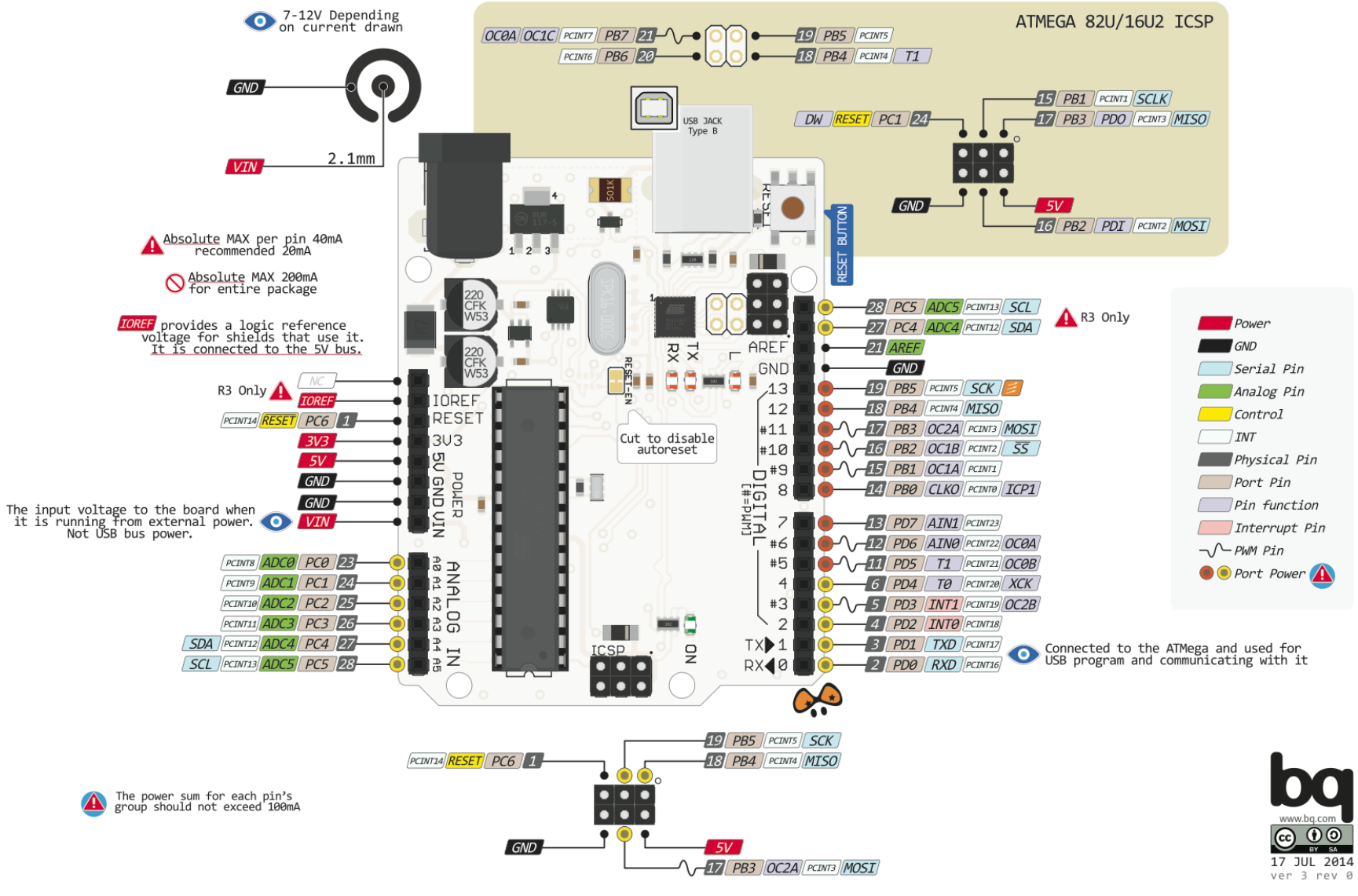
IDE ARDUINO

Instalación del IDE Oficial de Arduino



ARDUINO UNO

UNO PINOUT



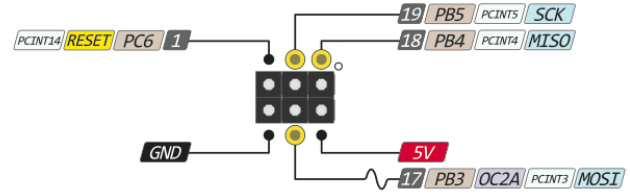
www.bq.com

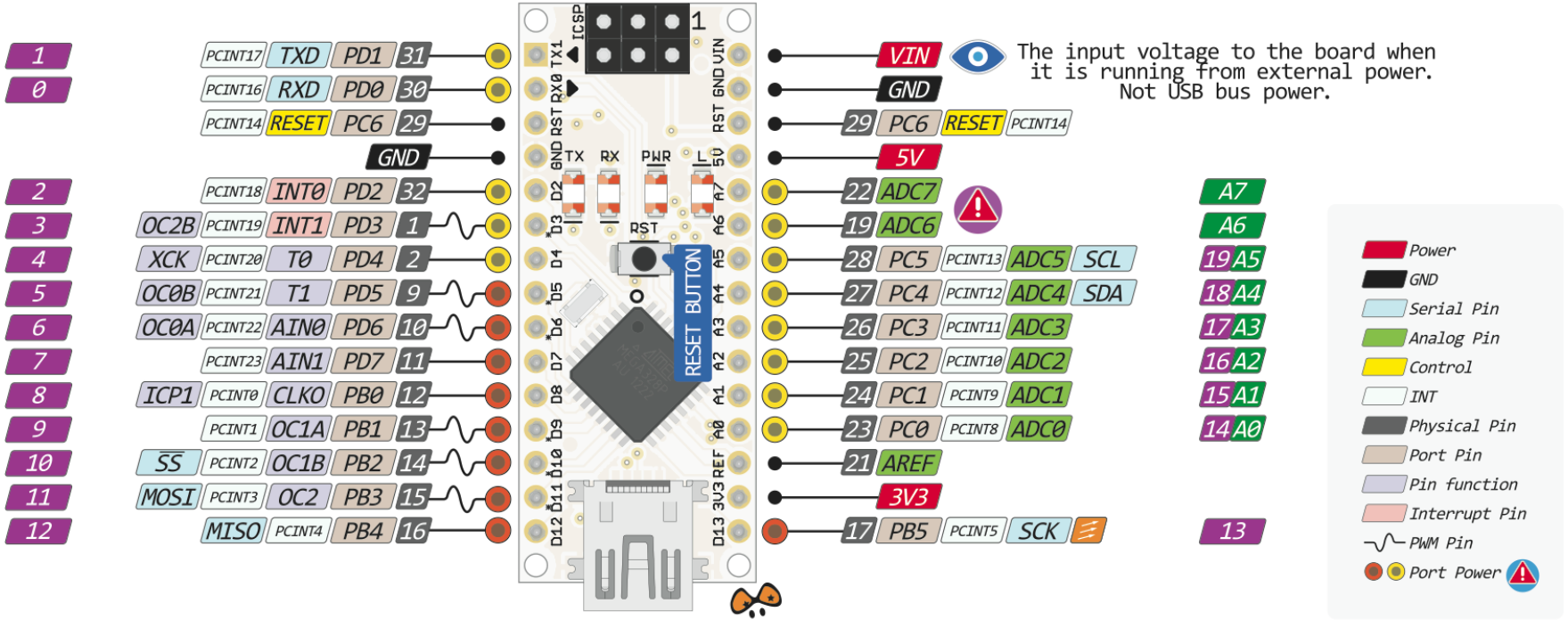
17 JUL 2014

ver 3 rev 0

ARDUINO NANO

NANO PINOUT



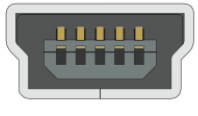


The input voltage to the board when it is running from external power. Not USB bus power.

- Power
- GND
- Serial Pin
- Analog Pin
- Control
- INT
- Physical Pin
- Port Pin
- Pin function
- Interrupt Pin
- PWM Pin
- Port Power

The power sum for each pin's group should not exceed 100mA

USB JACK
Mini Type B



Absolute MAX per pin 40mA
recommended 20mA

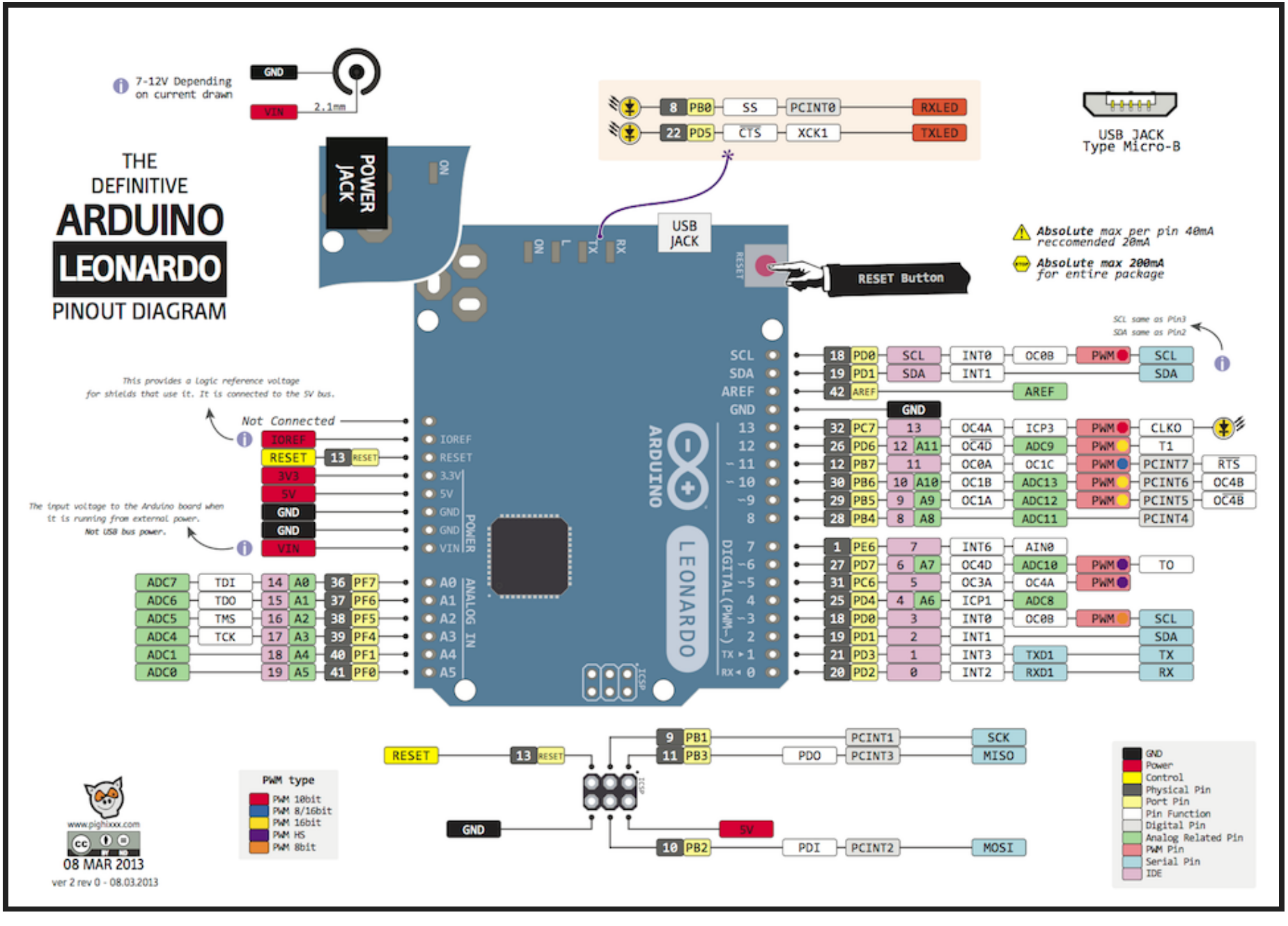
Absolute MAX 200mA
for entire package

Analog exclusively Pins

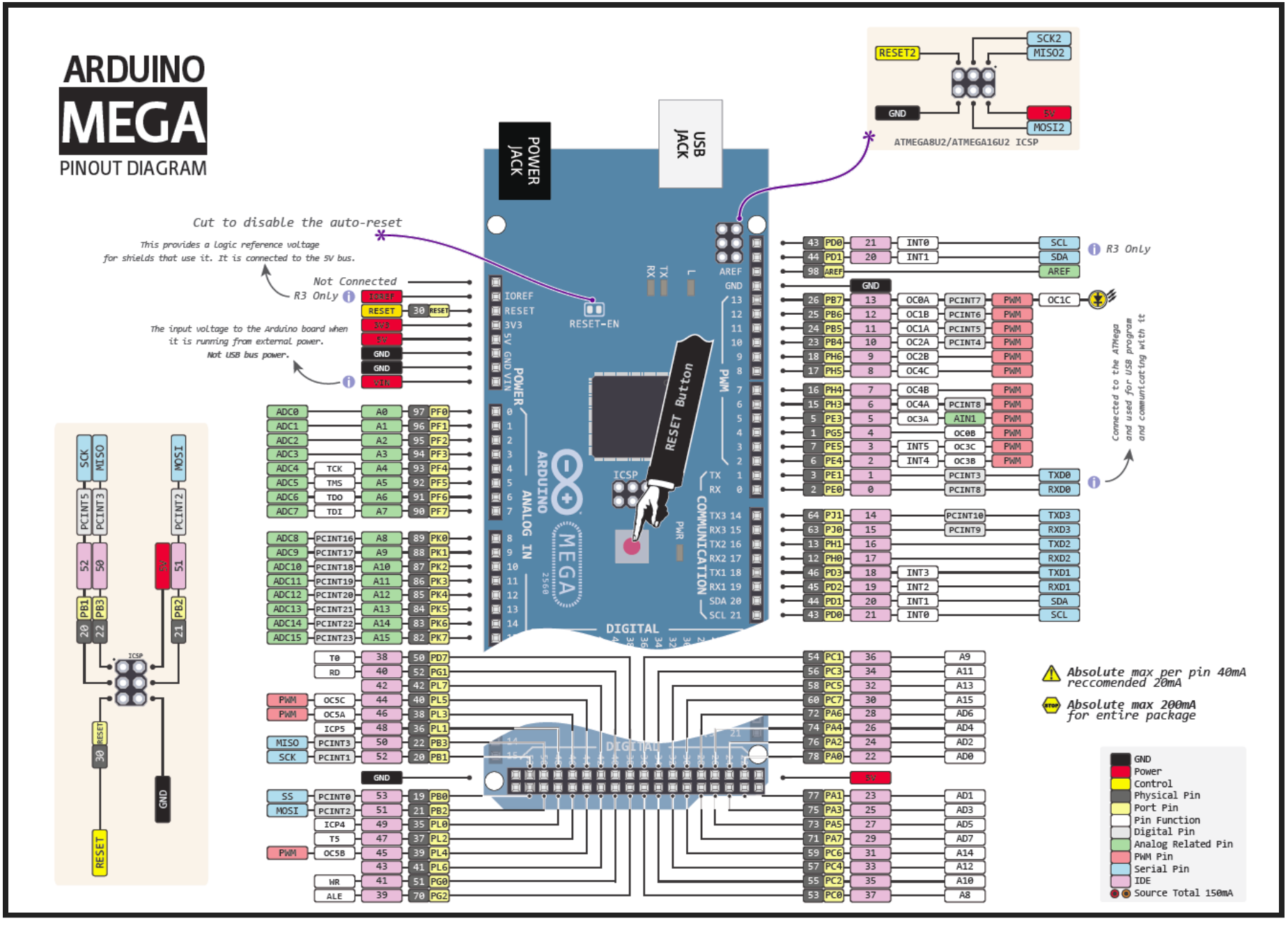
www.bq.com

19 AUG 2014
ver 3 rev 1

ARDUINO LEONARDO

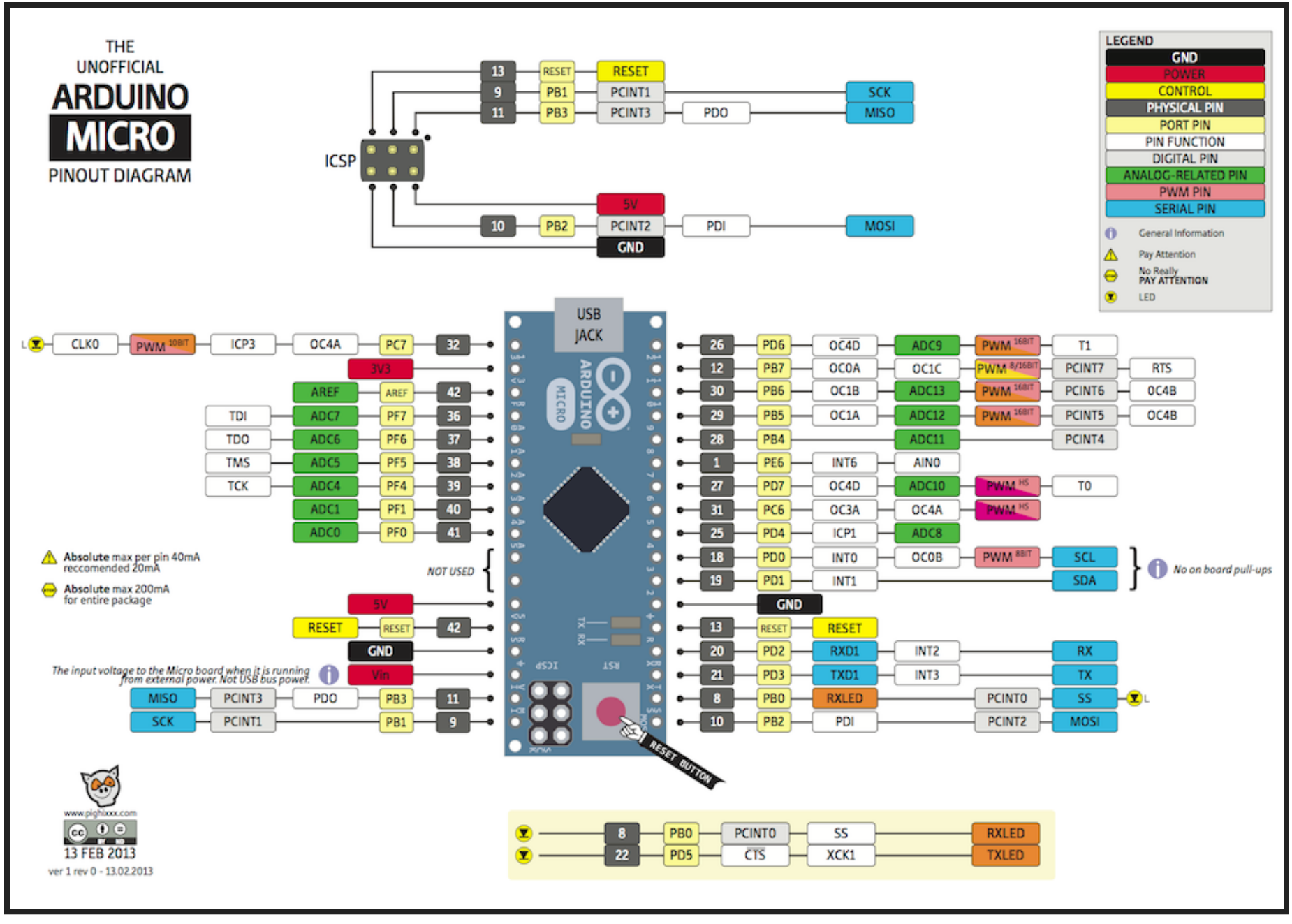

THE
DEFINITIVE
ARDUINO
LEONARDO
PINOUT DIAGRAM
7-12V Depending on current drawn
GND
VIN
2.1mm
POWER JACK
ON
USB JACK
RESET Button
USB JACK
Type Micro-B
8 PB0 SS PCINT0 RXLED
22 PD5 CTS XCK1 TXLED
Absolute max per pin 40mA
reccomended 20mA
Absolute max 200mA
for entire package
SCL same as Pin3
SDA same as Pin2
This provides a logic reference voltage
for shields that use it. It is connected to the 5V bus.
Not Connected
IOREF
RESET
3V3
5V
GND
GND
VIN
The input voltage to the Arduino board when
it is running from external power.
Not USB bus power.
POWER
ANALOG IN
DIGITAL (PWM~)
ARDUINO
LEONARDO
ICSP
ADC7 TDI 14 A0 36 PF7
ADC6 TDO 15 A1 37 PF6
ADC5 TMS 16 A2 38 PF5
ADC4 TCK 17 A3 39 PF4
ADC1 18 A4 40 PF1
ADC0 19 A5 41 PF0
18 PD0 SCL INT0 OC0B PWM SCL
19 PD1 SDA INT1 SDA
42 AREF AREF
GND
32 PC7 13 OC4A ICP3 PWM CLKO
26 PD6 12 A11 OC4D ADC9 PWM T1
12 PB7 11 OC0A OC1C PWM PCINT7 RTS
30 PB6 10 A10 OC1B ADC13 PWM PCINT6 OC4B
29 PB5 9 A9 OC1A ADC12 PWM PCINT5 OC4B
28 PB4 8 A8 ADC11 PCINT4
1 PE6 7 INT6 AIN0
27 PD7 6 A7 OC4D ADC10 PWM T0
31 PC6 5 OC3A OC4A PWM
25 PD4 4 A6 ICP1 ADC8
18 PD0 3 INT0 OC0B PWM SCL
19 PD1 2 INT1 SDA
21 PD3 1 INT3 TXD1 TX
20 PD2 0 INT2 RXD1 RX
RESET 13 RESET 9 PB1 PCINT1 SCK
11 PB3 PDO PCINT3 MISO
GND 5V
10 PB2 PDI PCINT2 MOSI
PWM type
PWM 10bit
PWM 8/16bit
PWM 16bit
PWM HS
PWM 8bit
GND
Power
Control
Physical Pin
Port Pin
Pin Function
Digital Pin
Analog Related Pin
PWM Pin
Serial Pin
IDE
www.pighixxx.com
08 MAR 2013
ver 2 rev 0 - 08.03.2013

ARDUINO MEGA


ARDUINO
MEGA
PINOUT DIAGRAM
POWER JACK
USB JACK
RESET-EN
RESET Button
ICSP
ATMEGA8U2/ATMEGA16U2 ICSP
RESET2
SCK2
MISO2
MOSI2
5V
GND
Cut to disable the auto-reset
This provides a logic reference voltage for shields that use it. It is connected to the 5V bus.
Not Connected
R3 Only
IOREF
RESET
3V3
5V
GND
VIN
The input voltage to the Arduino board when it is running from external power.
Not USB bus power.
POWER
ANALOG IN
DIGITAL
COMMUNICATION
PWM
AREF
SCL
SDA
TX
RX
L
PWR
Connected to the ATMega and used for USB program and communicating with it
Absolute max per pin 40mA
reccomended 20mA
Absolute max 200mA
for entire package
GND
Power
Control
Physical Pin
Port Pin
Pin Function
Digital Pin
Analog Related Pin
PWM Pin
Serial Pin
IDE
Source Total 150mA

ARDUINO MICRO

THE UNOFFICIAL ARDUINO MICRO PINOUT DIAGRAM



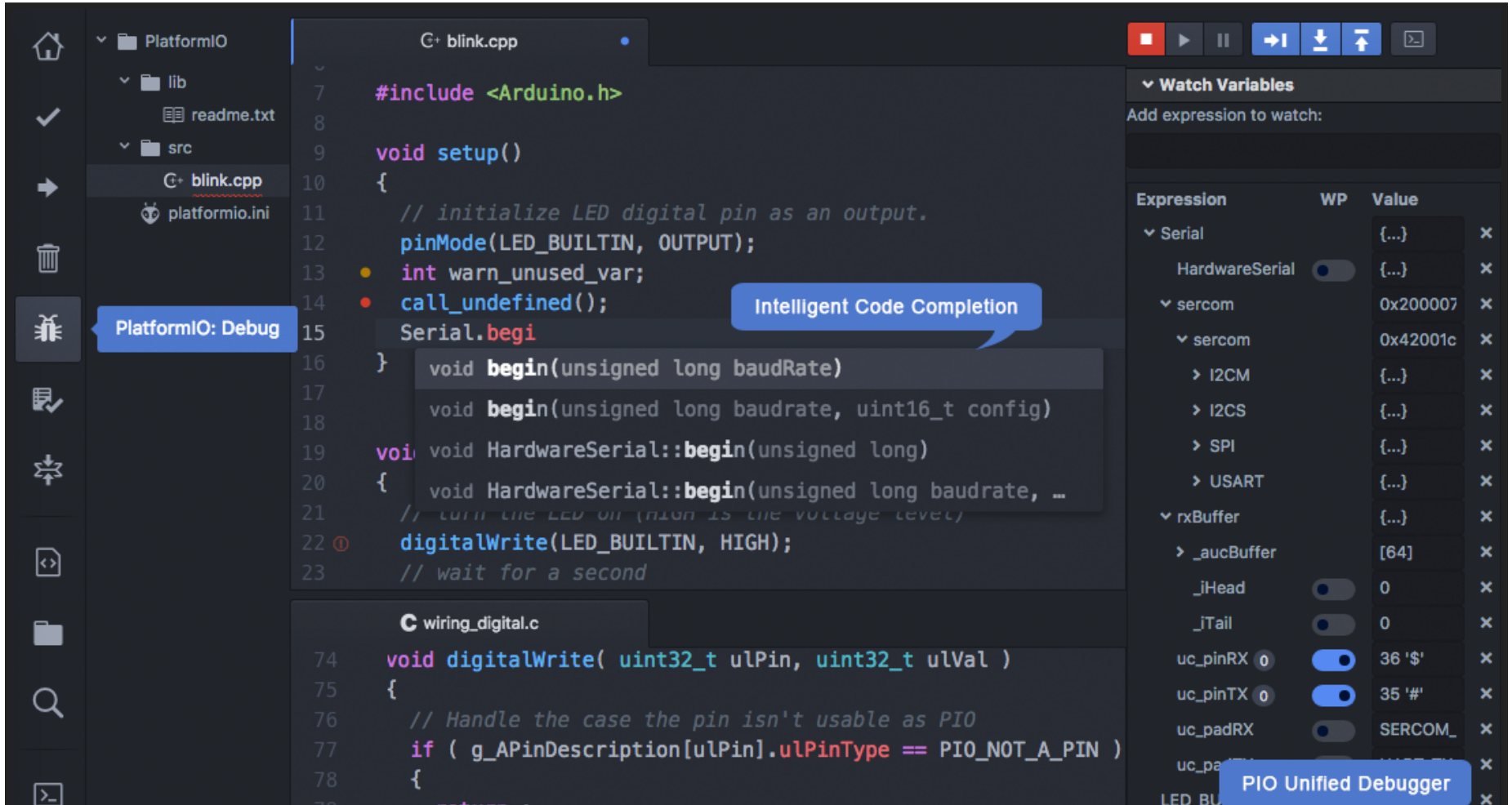
13 FEB 2013

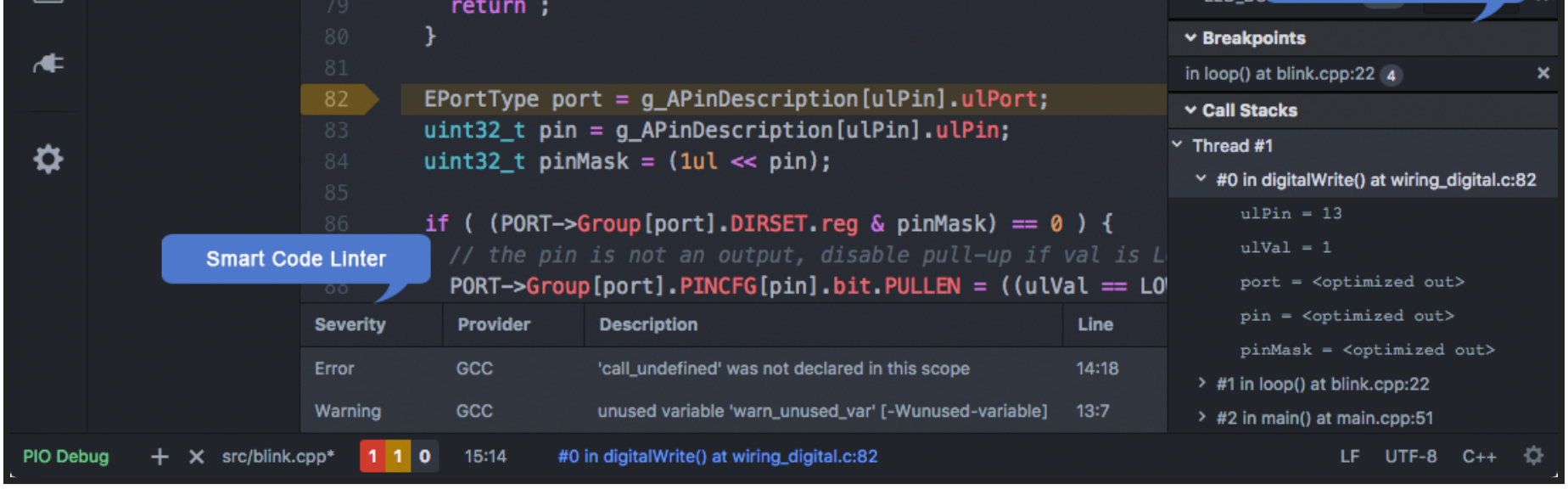
ver 1 rev 0 - 13.02.2013

PLATFORMIO

http://platformio.org/

PlatformIO IDE for IoT development




return ;
}
EPortType port = g_APinDescription[ulPin].ulPort;
uint32_t pin = g_APinDescription[ulPin].ulPin;
uint32_t pinMask = (1ul << pin);
if ((PORT->Group[port].DIRSET.reg & pinMask) == 0) {
// the pin is not an output, disable pull-up if val is L
PORT->Group[port].PINCFG[pin].bit.PULLEN = ((ulVal == LO
Smart Code Linter
Severity
Provider
Description
Line
Error
GCC
'call_undefined' was not declared in this scope
14:18
Warning
GCC
unused variable 'warn_unused_var' [-Wunused-variable]
13:7
Breakpoints
in loop() at blink.cpp:22 4
Call Stacks
Thread #1
#0 in digitalWrite() at wiring_digital.c:82
ulPin = 13
ulVal = 1
port = <optimized out>
pin = <optimized out>
pinMask = <optimized out>
#1 in loop() at blink.cpp:22
#2 in main() at main.cpp:51
PIO Debug
src/blink.cpp*
1 1 0
15:14
#0 in digitalWrite() at wiring_digital.c:82
LF
UTF-8
C++

PRÁCTICAS CON ARDUINO

- LEDs
- Pulsadores
- Display LCD
- LDR
- Buzzer
- Sensor Ultrasónico
- Sensor Infrarojo