Arduino UNO

The Board

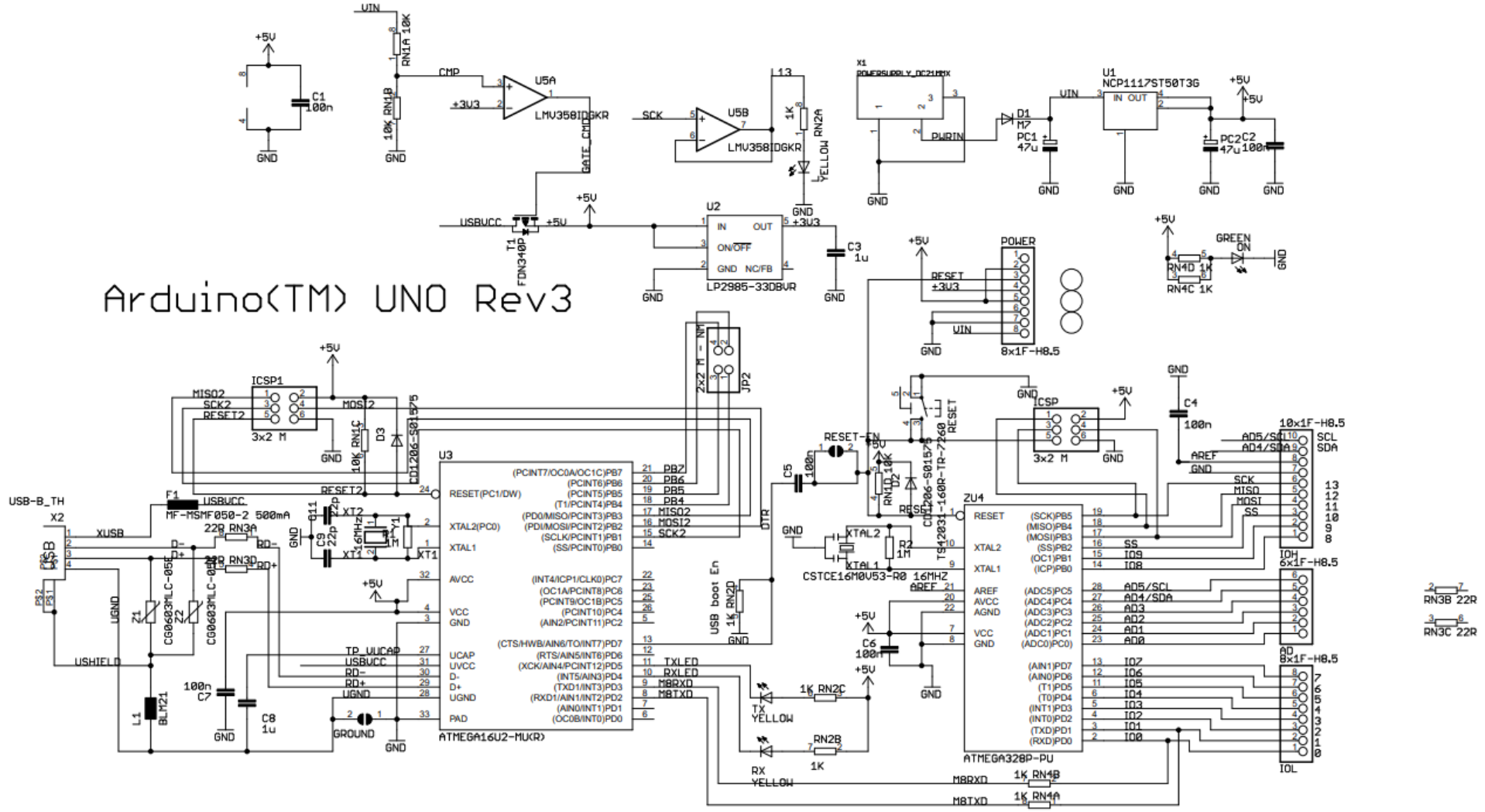

UNO
ARDUINO
MADE IN ITALY
DIGITAL (PWM~)
POWER
ANALOG IN
RESET
3.3V
5V
GND
Vin
IOREF
A0
A1
A2
A3
A4
A5

Arduino UNO-Specifications

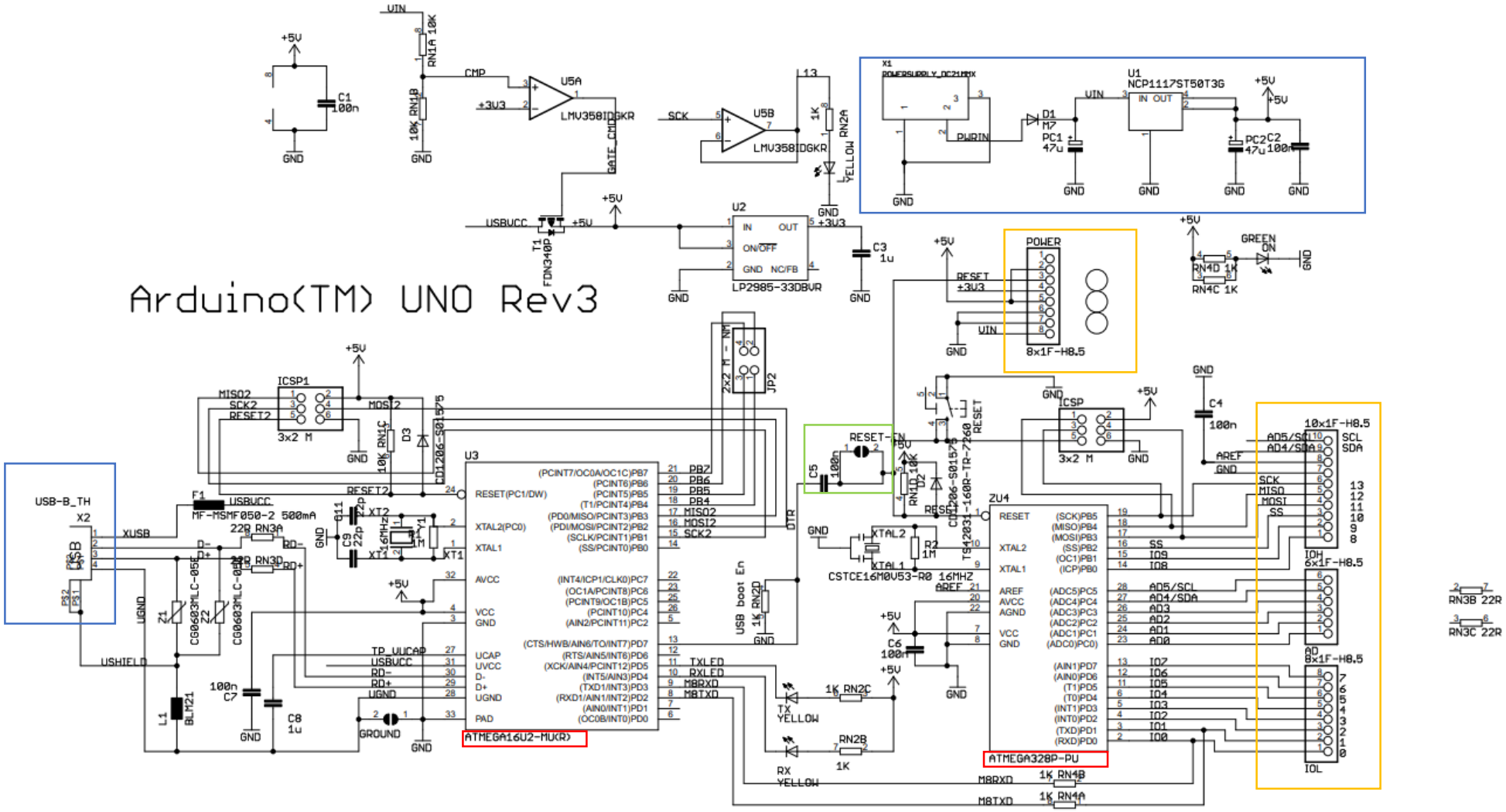
Microcontroller	**ATmega328P**
Communication Type	USB Type B
Operating Voltage	5V
Input Voltage	7-12V (Recommended) 20V(Max)
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per Pin	20mA (I/O Pins) 50mA(3.3V Pins)

This is a warning, not a challenge

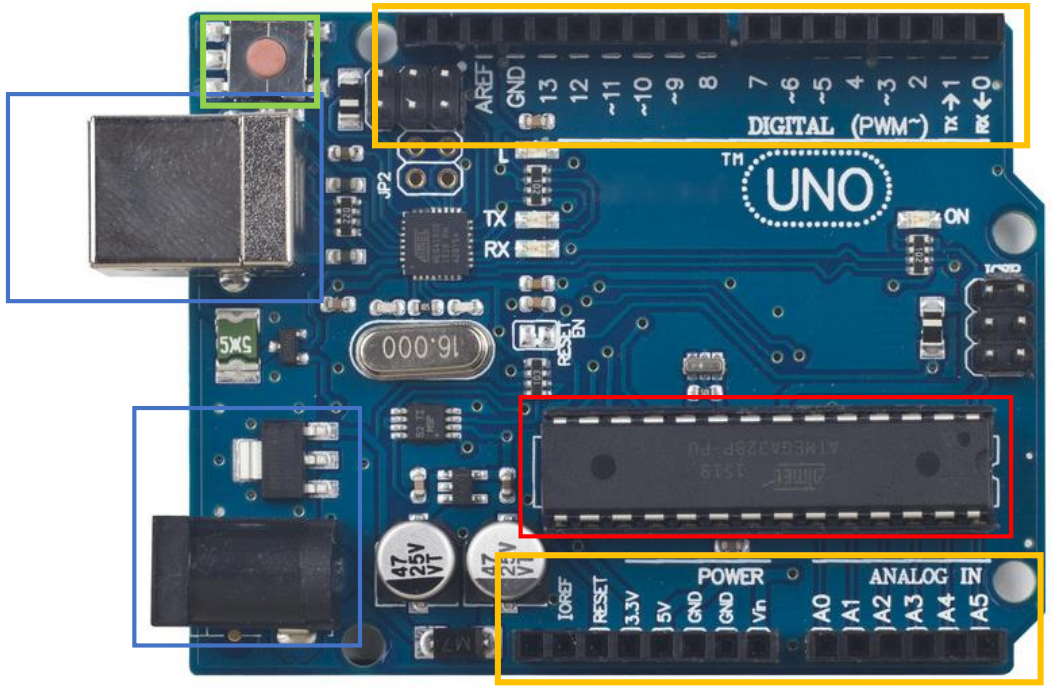
UNO Schematic



Yeah….


Arduino(TM) UNO Rev3
ATMEGA16U2-MUR
ATMEGA328P-PU
LMV358IDGKR
LP2985-33DBVR
NCP1117ST50T3G
CSTCE16M0V53-R0 16MHZ
USB-B_TH
ICSP1
ICSP
POWER
8x1F-H8.5
10x1F-H8.5
6x1F-H8.5
3x2 M
GND
+5V
+3V3
VIN
SCL
SDA
SCK
MISO
MOSI
SS
AREF
RESET
XTAL1
XTAL2
TXLED
RXLED
M8RXD
M8TXD
USBVCC
USHIELD
UGND
GREEN ON
TX YELLOW
RX YELLOW

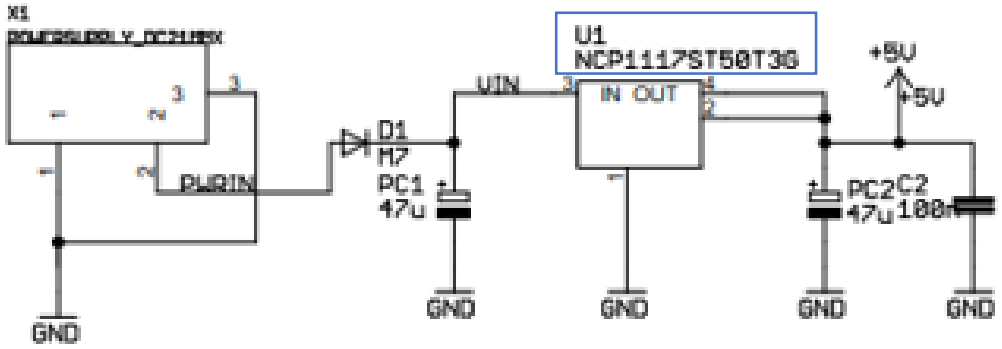
Board Topology



https://www.youtube.com/watch?v=6-_AgqpjOiU

Why are Schematics useful?

- Lets say I have a program loaded onto my Arduino Board.
- I couldn’t find anything to power it, so I plugged my 25V laptop charger because the power plug fitted into the Arduino.
- After powering on the charger, one of the parts of my board started smoking. Why did this happen?

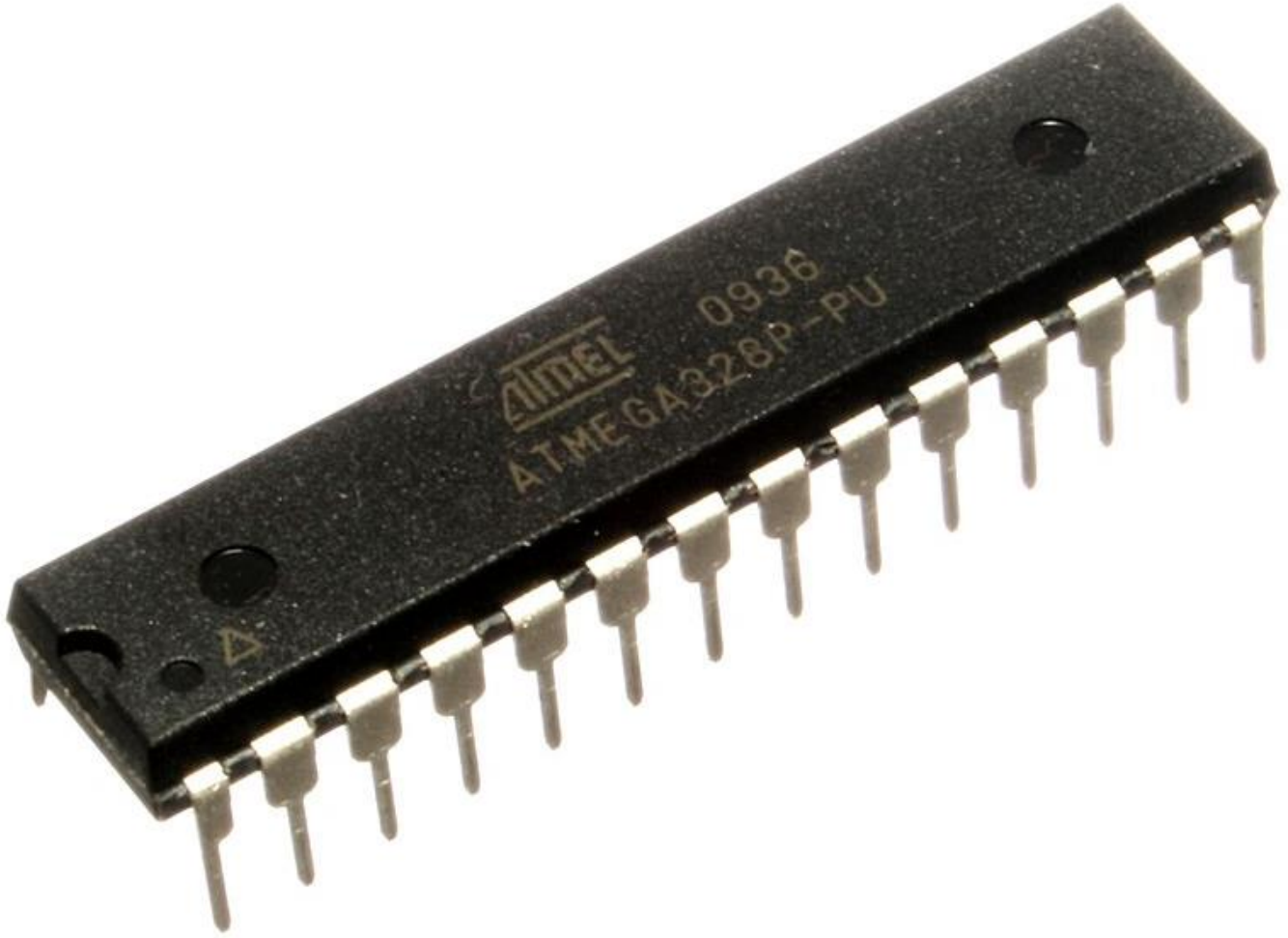


NCP1117(On board Voltage regulator)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage (Note 1)	V_{in}	20	V

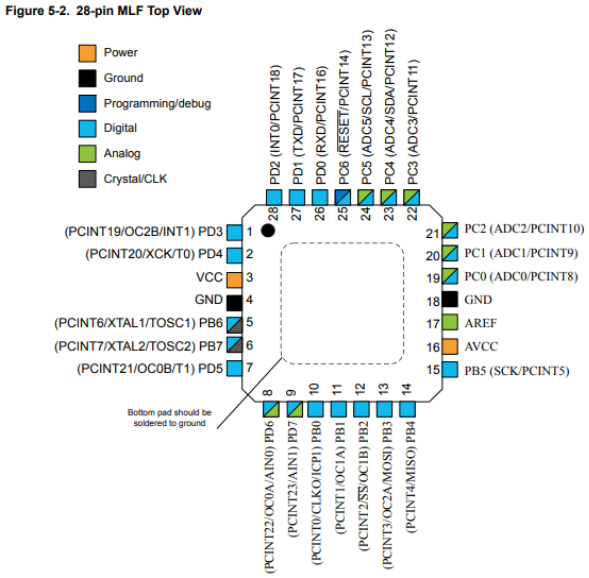
ATmega328P

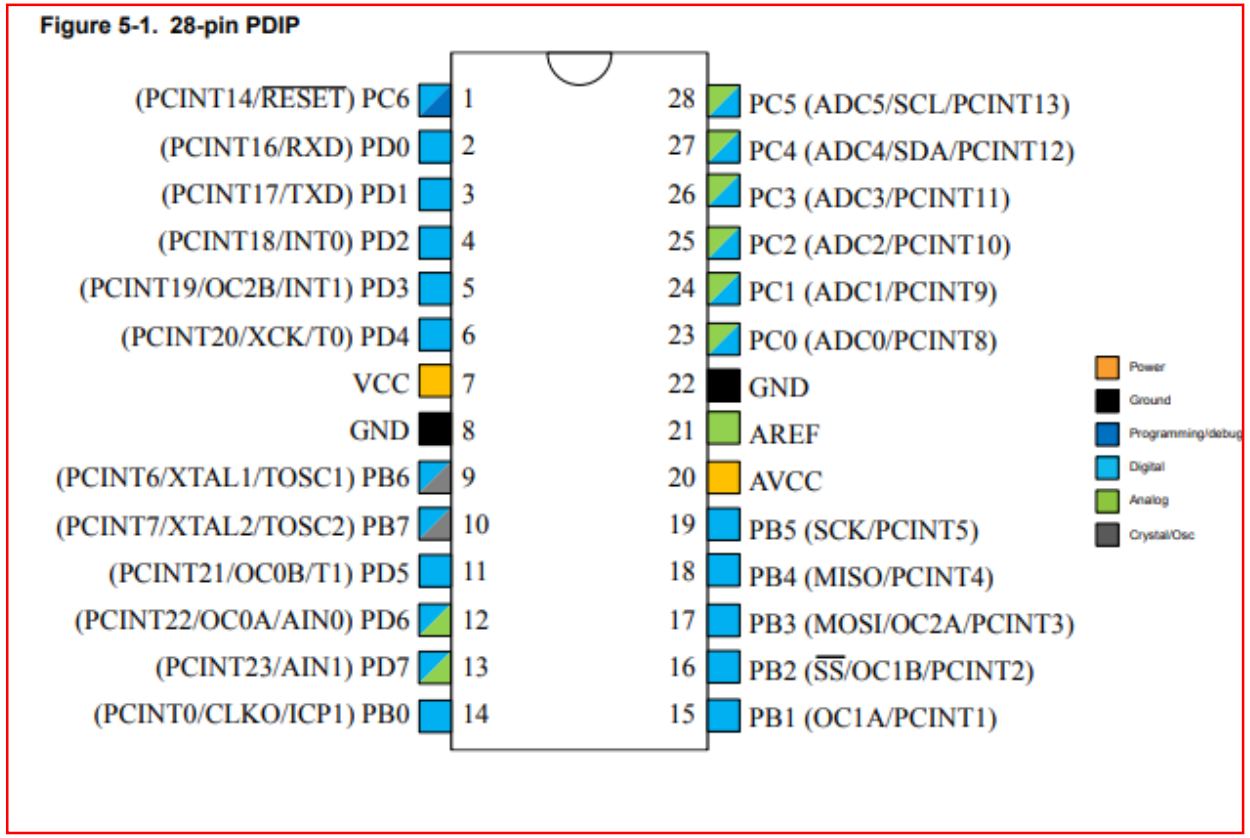


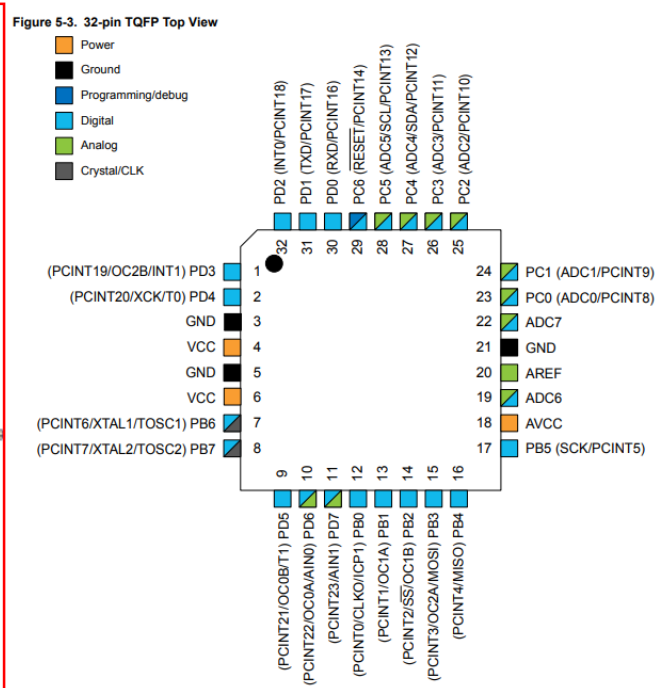
ATmega328P-Specification

Pin Count	28 (32 TQFP)
Flash Memory	32 KB (0.5 KB used by bootloader)
SRAM	2 KB
EEPROM	1KB
I/O Lines	23
Serial	2xSPI, 1xI2C, 1xUSART
ADC	8 Channels, 10-bit 15kSPS
Timer Modules	2x 8-bit Timers, 1x 16-bit Timers

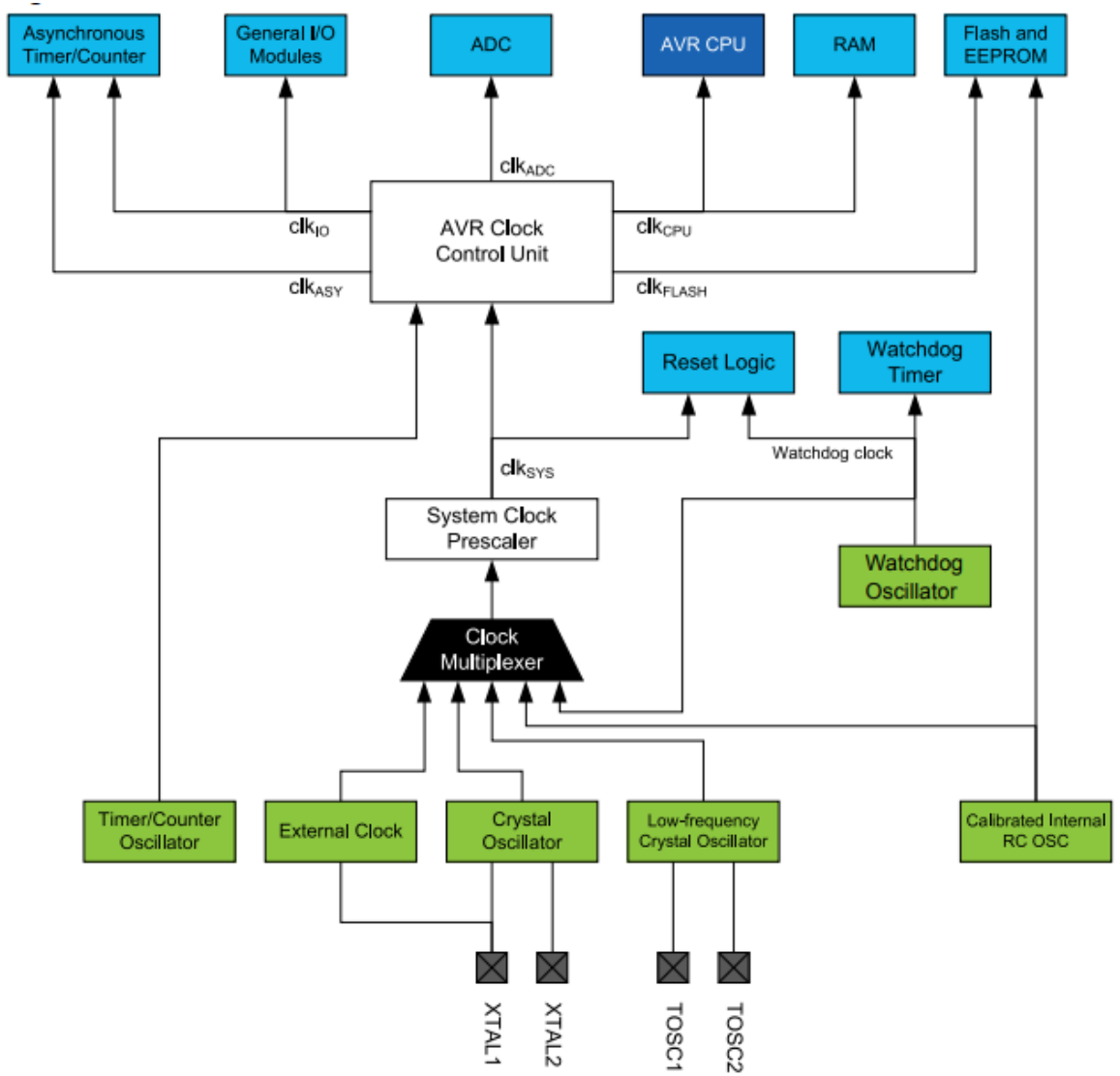
ATmega328P Pin Allocations



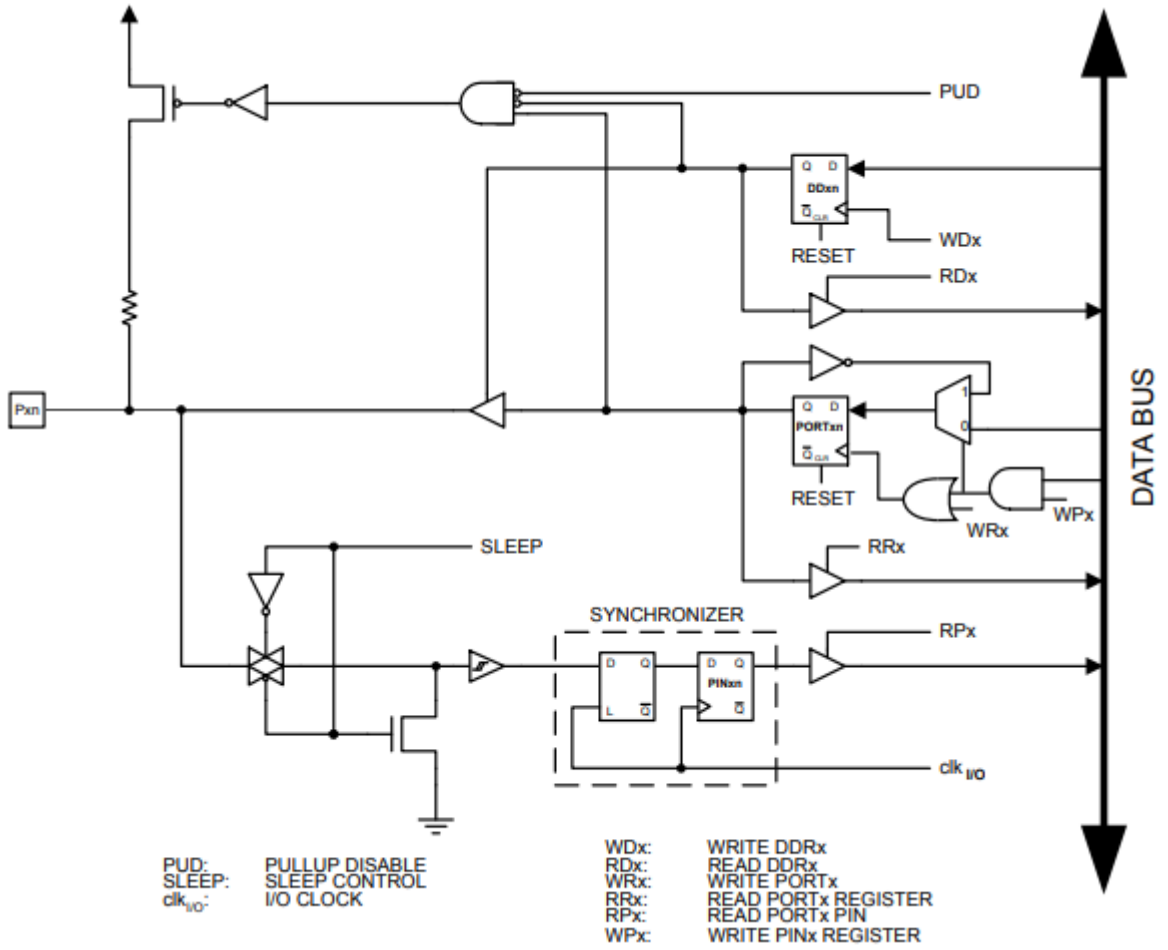




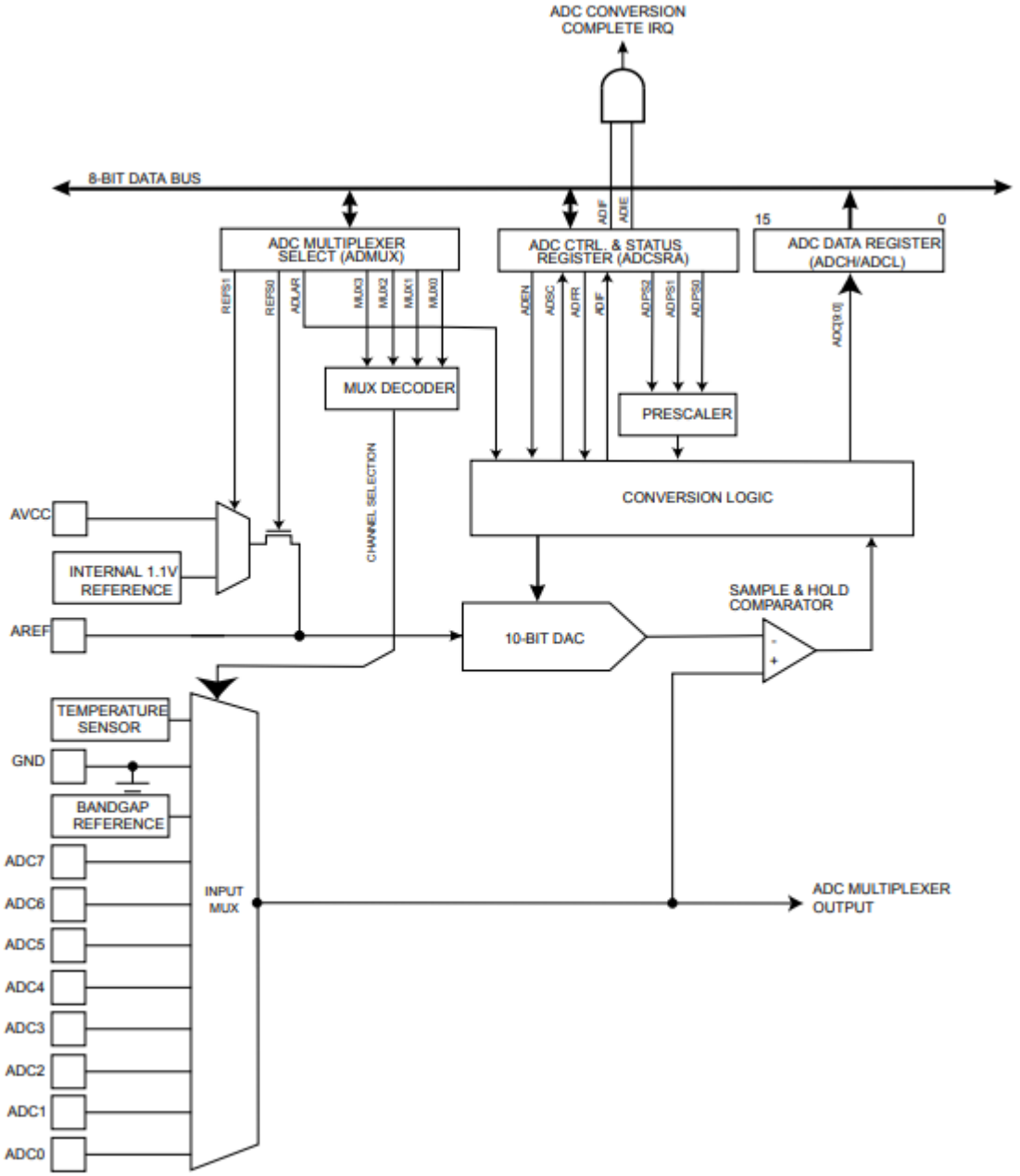
ATmega328P Clock systems



ATmega328P Digital I/Os



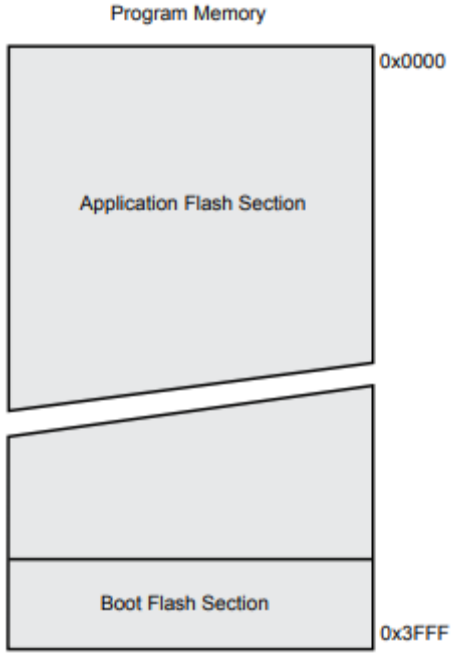
ATmega328P Analog-Digital Conversion



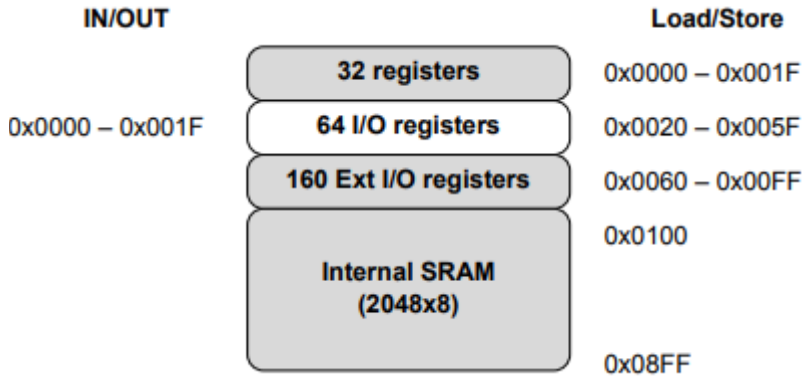
ATmega328P Memory Organisation

- FLASH- The in chip reprogrammable memory space for program storage.
- Flash is organized as 16Kx16
- 14bits wide program counter
- SRAM- Data memory
- Five different addressing modes (refer to datasheet)

FLASH 32KB



SRAM 2KB

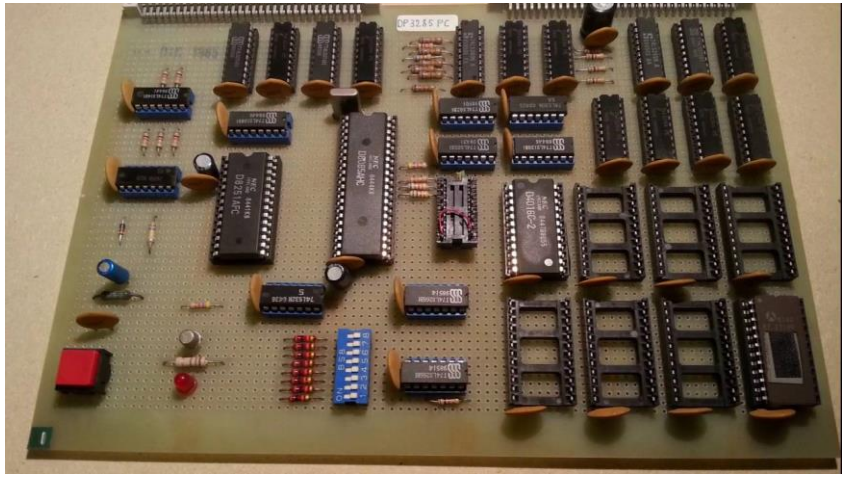


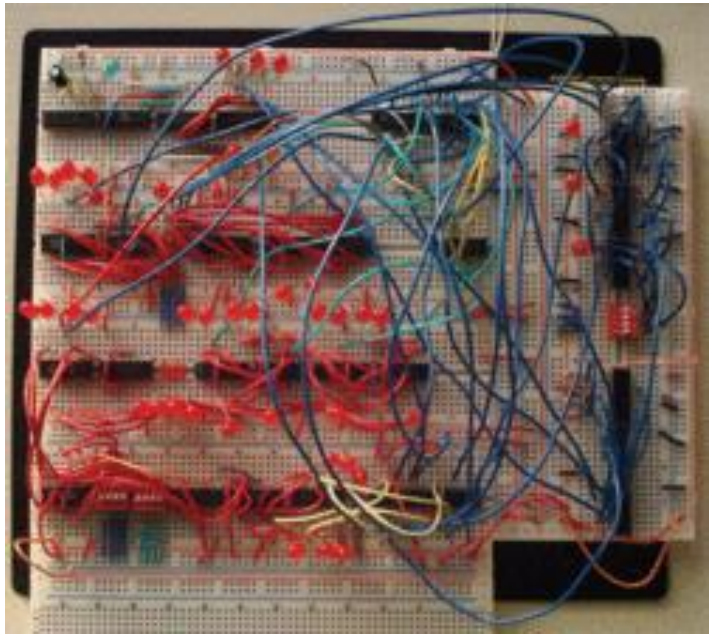
ATmega328P Registers

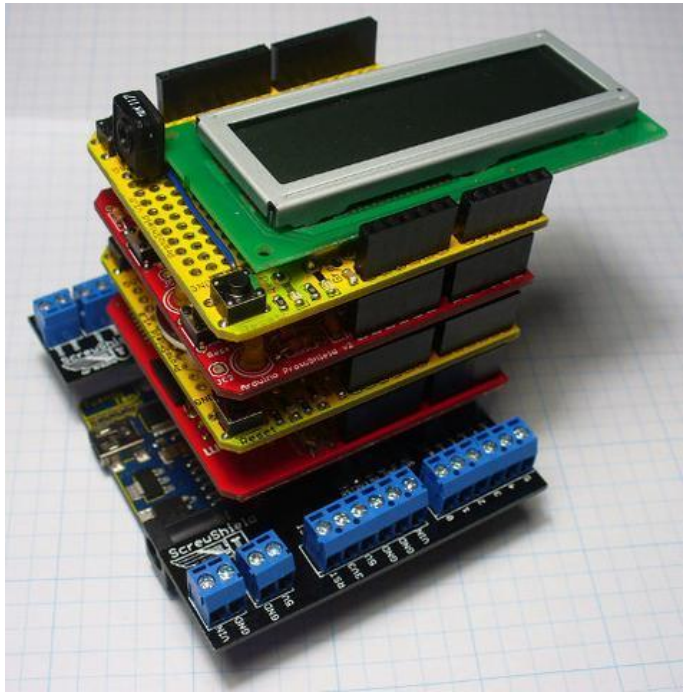
Refer to datasheet for specific registers

- Processor Registers allows:
  - The configuration of operations (Read/Writable)
    - Analog to digital conversions
    - Timers
    - Serial communications
    - etc
  - The Inspection of Status during operations (Often Read only)
    - ADC Data Register
- Registers are normally one byte (8 bit) in size, registers such as TCNTxL/TCNTxH and ADCL /ADCH are two 8 bit registers that combine into a 16 bit result.

Creative Ideas







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