

# KiCAD: circuiti stampati con Linux



Paolo Cravero | Olim|troniK | MuPiIn

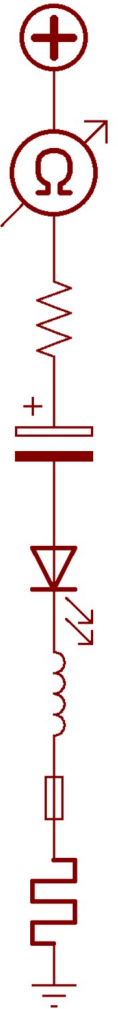


Linux Day Torino 2024



# Chi siamo

- Io:
  - Elettronico dall'età di 11 anni
  - Professionista della sicurezza informatica
  - Membro attivo del Museo Piemontese dell'Informatica O.d.V. ([www.mupin.it](http://www.mupin.it))
  - Genitore, marito, radioamatore, viaggiatore, osservatore, riparatore, ...
- Il computer:
  - Lenovo ThinkPad T520 del 2018, quad-core i5, 8 GB RAM
  - Ubuntu 22.04
  - KiCAD 8.0.6 (pacchetto ufficiale per Ubuntu 22)
  - Presentazione creata con LibreOffice 7.3 (che fatica)





# Disclaimer

- Questa è una sessione per principianti
- Non sono un guru di KiCAD o di EDA, solo un utente soddisfatto
- Non si può vedere tutto in un'ora
- Questo intervento non è sponsorizzato



# KiCAD



È una suite "Electronic Design Automation" (EDA) open source. Gestisce la creazione di schemi elettrici, lo sbroglio dei circuiti stampati e produce i file Gerber richiesti dalle FabHouse.

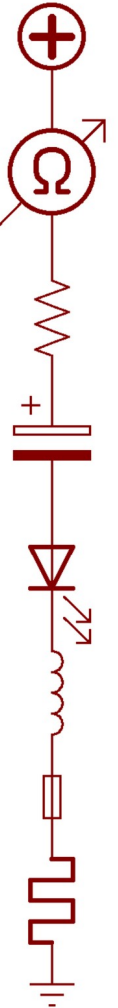
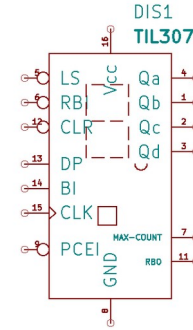
La suite è rilasciata con licenza GPLv3 e funziona su Linux, Windows e MacOS.

È stato lanciato nel 1992, ha una comunità molto attiva e con attori importanti come il CERN.



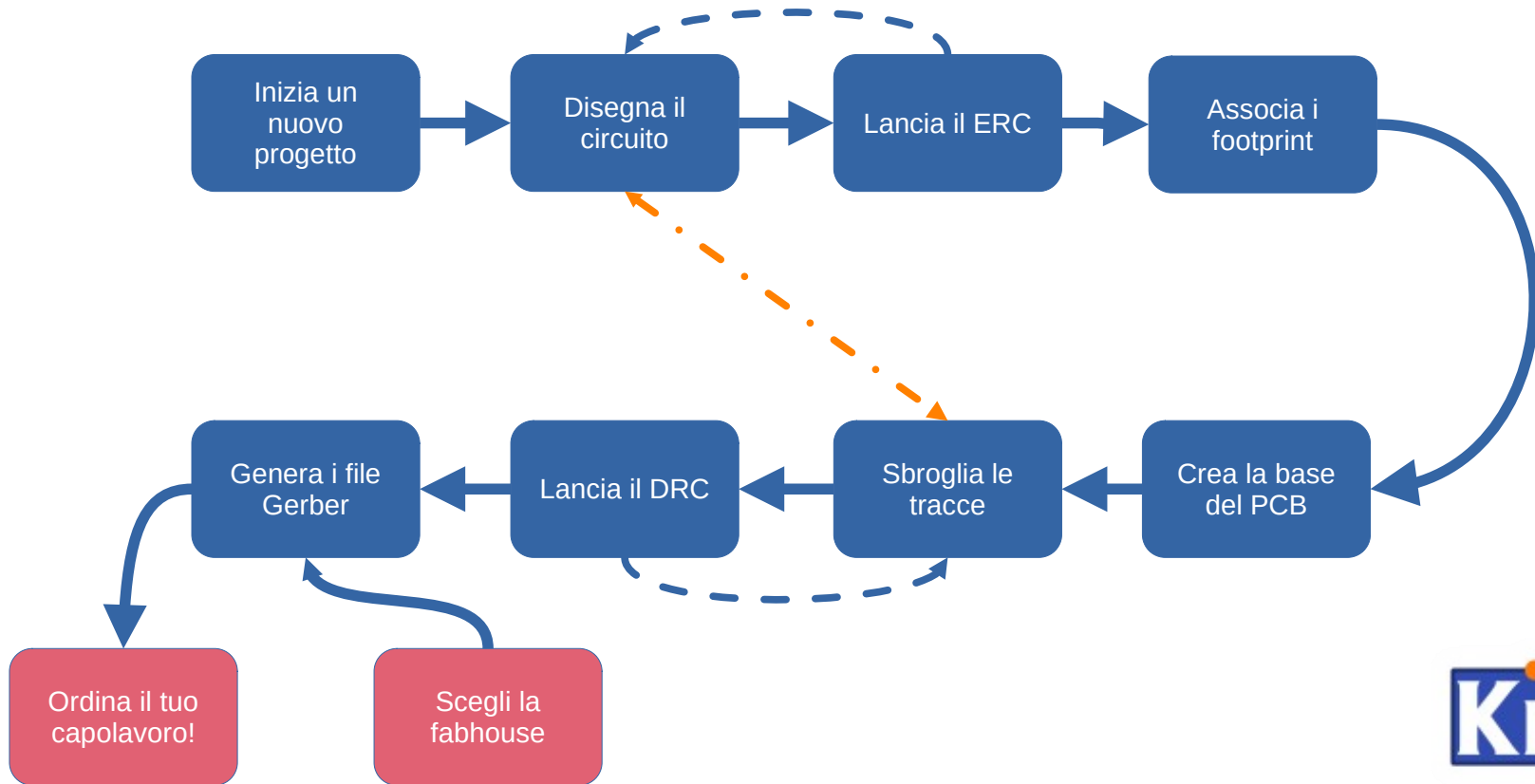
# Caratteristiche

- Open source e gratuito
  - Gestisce schede fino a 16 layer
  - Supporta gli script
  - Ha tanti plugin e software di supporto
  - Posso creare i miei simboli e footprint
  - È ottimo anche per la "PCB Art" ed i pannelli frontali delle nostre realizzazioni
- 
- Sito <https://www.kicad.org/>
  - Sorgenti: <https://gitlab.com/kicad>

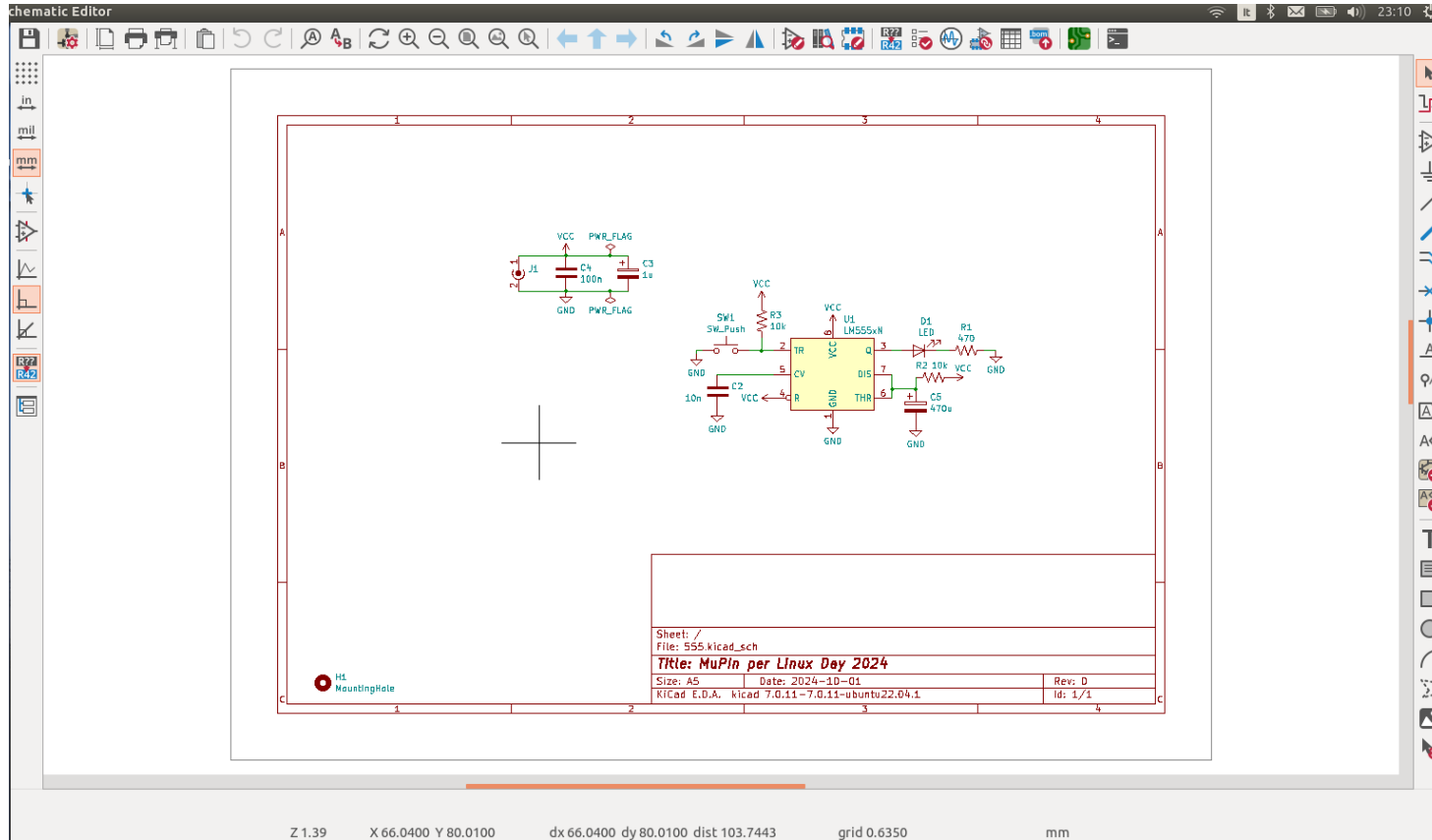




# Flusso di sviluppo di un PCB

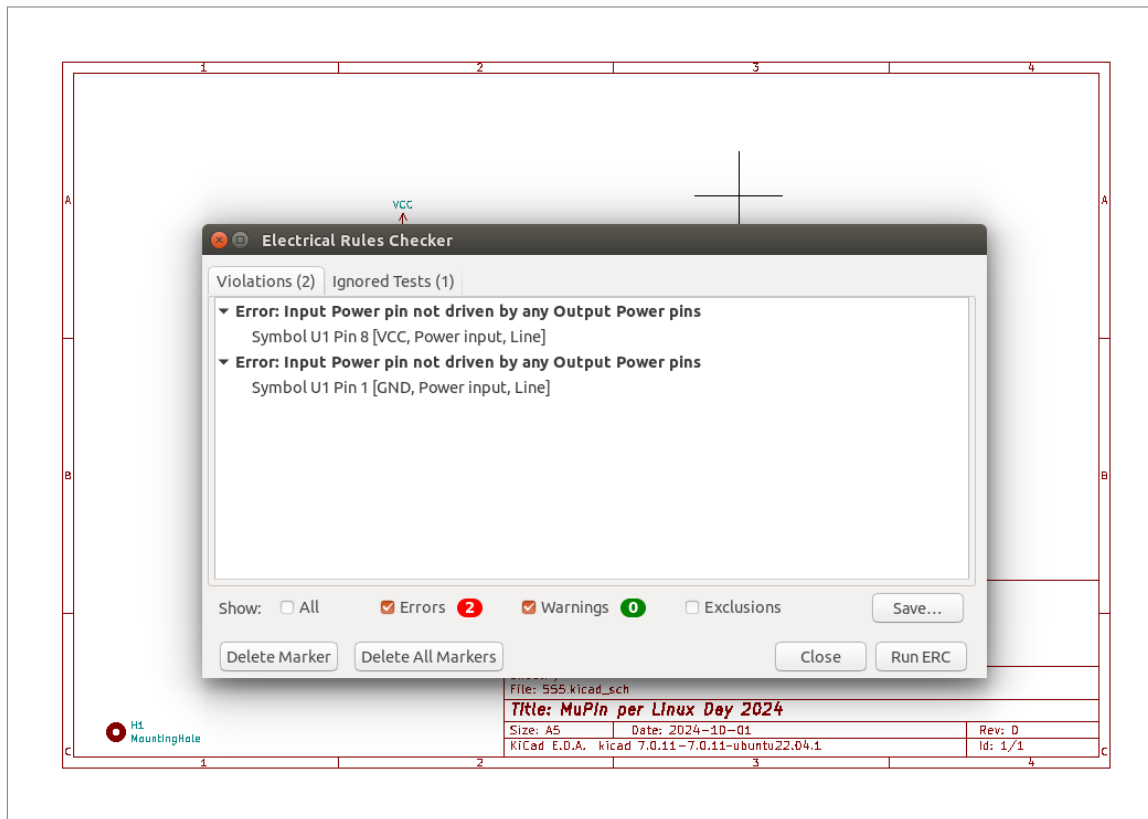


# Schematic Editor





# Schematic Editor - Electrical Rules Checker







# Schematic Editor - Assign Footprints



footprints

Footprint Libraries

- Audio\_Module
- Battery
- Button\_Switch\_Keyboard
- Button\_Switch\_SMD
- Button\_Switch\_THT
- Buzzer\_Beeper
- Calibration\_Scale
- Capacitor\_SMD
- Capacitor\_THT
- Capacitor\_Tantalum\_SMD
- Connector
- Connector\_AMASS
- Connector\_Amphenol
- Connector\_Audio
- Connector\_BarrelJack
- Connector\_Card
- Connector\_Coaxial
- Connector\_DIN
- Connector\_Dsub
- Connector\_FFC-FPC
- Connector\_HDMI
- Connector\_Harting
- Connector\_Harwin
- Connector\_Hirose
- Connector\_IDC
- Connector\_JAE
- Connector\_JST
- Connector\_Molex
- Connector\_PCBEdge
- Connector\_Phoenix\_GMSTB
- Connector\_Phoenix\_M6

Footprint Filters:

Symbol : Footprint Assignments

| 1  | C2 -                      | 10n : Capacitor_THT:C_Rect_L7.0mm_W3.5mm_P2.50mm_P5.00mm   |
|----|---------------------------|--|
| 2  | C3 -                      | 1u : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm                |
| 3  | C4 -                      | 100n : Capacitor_THT:C_Rect_L7.0mm_W3.5mm_P2.50mm_P5.00mm  |
| 4  | C5 -                      | 470u : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm              |
| 5  | D1 -                      | LED : LED_THT:LED_D5.0mm                                   |
| 6  | H1 -                      | MountingHole : MountingHole:MountingHole_2.5mm             |
| 7  | J1 - Conn_Coaxial_Power : | Connector_PinHeader_2.54mm:PinHeader_1x02_P2.54mm_V        |
| 8  | R1 -                      | 470 : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_V |
| 9  | R2 -                      | 10k : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_V |
| 10 | R3 -                      | 10k : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P2.54mm_V |
| 11 | SW1 -                     | SW_Push : Button_Switch_THT:SW_PUSH_6mm                    |
| 12 | U1 -                      | LM555xN : Package_DIP:DIP-8_W7.62mm                        |

Filtered Footprints

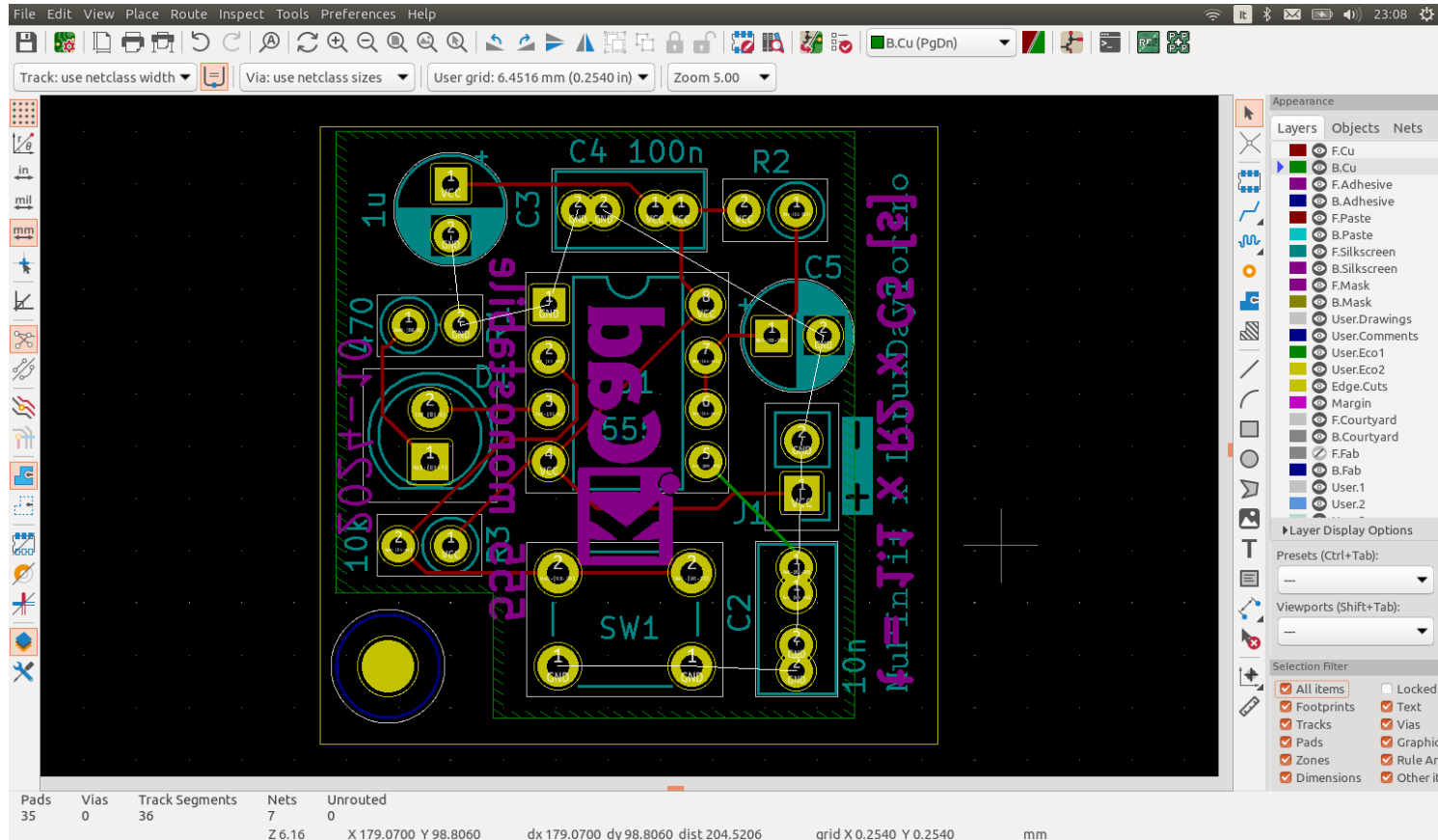
- 657 Capacitor\_THT:C\_Disc\_D14.5mm\_W5.0mm\_P10
- 658 Capacitor\_THT:C\_Disc\_D16.0mm\_W5.0mm\_P7.
- 659 Capacitor\_THT:C\_Disc\_D16.0mm\_W5.0mm\_P10
- 660 Capacitor\_THT:C\_Radial\_D4.0mm\_H5.0mm\_P1
- 661 Capacitor\_THT:C\_Radial\_D4.0mm\_H7.0mm\_P1
- 662 Capacitor\_THT:C\_Radial\_D5.0mm\_H5.0mm\_P2
- 663 Capacitor\_THT:C\_Radial\_D5.0mm\_H7.0mm\_P2
- 664 Capacitor\_THT:C\_Radial\_D5.0mm\_H11.0mm\_P
- 665 Capacitor\_THT:C\_Radial\_D6.3mm\_H5.0mm\_P2
- 666 Capacitor\_THT:C\_Radial\_D6.3mm\_H7.0mm\_P2
- 667 Capacitor\_THT:C\_Radial\_D6.3mm\_H11.0mm\_P3
- 668 Capacitor\_THT:C\_Radial\_D8.0mm\_H7.0mm\_P3
- 669 Capacitor\_THT:C\_Radial\_D8.0mm\_H11.5mm\_P
- 670 Capacitor\_THT:C\_Radial\_D10.0mm\_H12.5mm\_
- 671 Capacitor\_THT:C\_Radial\_D10.0mm\_H16.0mm\_
- 672 Capacitor\_THT:C\_Radial\_D10.0mm\_H20.0mm\_
- 673 Capacitor\_THT:C\_Radial\_D12.5mm\_H20.0mm\_
- 674 Capacitor\_THT:C\_Radial\_D12.5mm\_H25.0mm\_
- 675 Capacitor\_THT:C\_Radial\_D16.0mm\_H25.0mm\_
- 676 Capacitor\_THT:C\_Radial\_D16.0mm\_H31.5mm\_
- 677 Capacitor\_THT:C\_Radial\_D18.0mm\_H35.5mm\_
- 678 Capacitor\_THT:C\_Rect\_L4.0mm\_W2.5mm\_P2.5
- 679 Capacitor\_THT:C\_Rect\_L4.6mm\_W2.0mm\_P2.5
- 680 Capacitor\_THT:C\_Rect\_L4.6mm\_W3.0mm\_P2.5
- 681 Capacitor\_THT:C\_Rect\_L4.6mm\_W3.8mm\_P2.5
- 682 Capacitor\_THT:C\_Rect\_L4.6mm\_W4.6mm\_P2.5
- 683 Capacitor\_THT:C\_Rect\_L4.6mm\_W5.5mm\_P2.5
- 684 Capacitor\_THT:C\_Rect\_L7.0mm\_W2.0mm\_P5.0
- 685 Capacitor\_THT:C\_Rect\_L7.0mm\_W2.5mm\_P5.0
- 686 Capacitor\_THT:C\_Rect\_L7.0mm\_W3.5mm\_P2.5
- 687 Capacitor\_THT:C\_Rect\_L7.0mm\_W3.5mm\_P5.0

Filtered by Library: 13297  
Description: C\_Rect series, Radial, pin pitch=2.50mm 5.00mm, , length\*width=7\*3.5mm^2, Capacitor; Keywords: C\_Rect series Radial pin pitch 2.50mm 5.00mm length 7mm width 3.5mm Capacitor  
Library location: /usr/share/kicad/footprints/Capacitor\_THT.pretty

Apply, Save Schematic & Continue Cancel OK

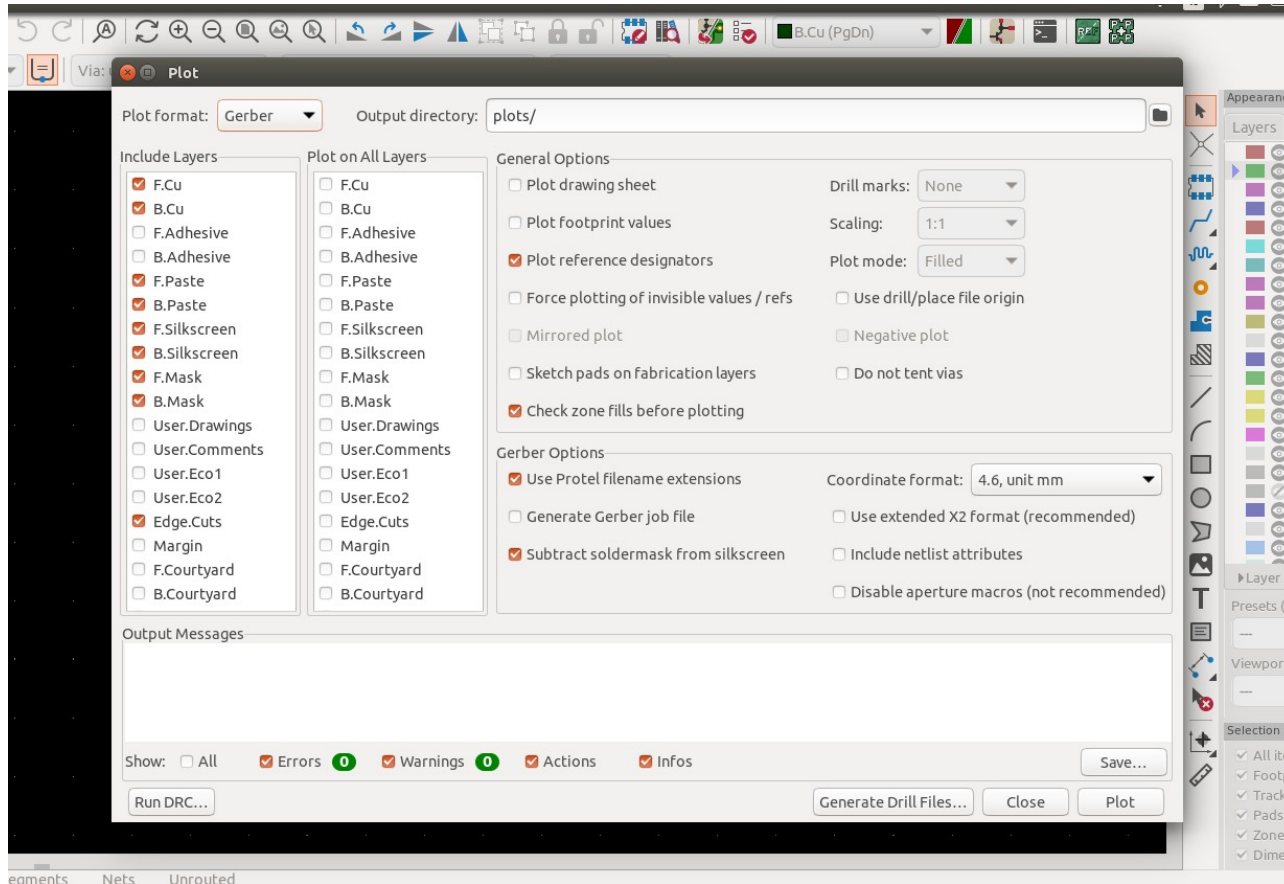


# PCB Editor





# PCB Editor - Fabrication outputs



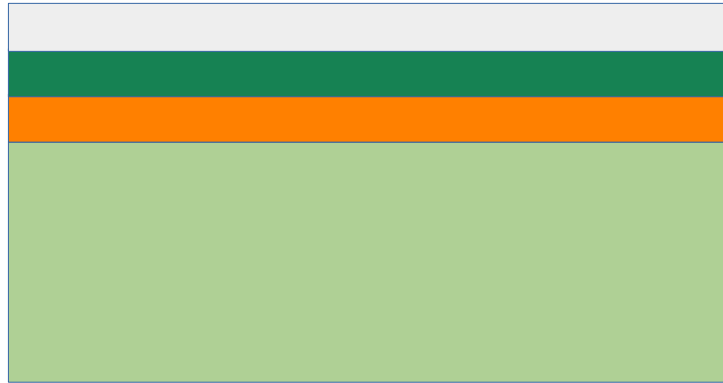
NB: nel generare i file Gerber seguire le indicazioni della FabHouse scelta!

# Consigli pratici



- Se lavorate su un laptop, usate un mouse esterno
- Usare due schermi agevola lo sbroglio del PCB
- Imparate le scorciatoie da tastiera per le operazioni più comuni: Edit, Drag, Move, Delete, Add component
- Il menù contestuale del mouse è utilissimo

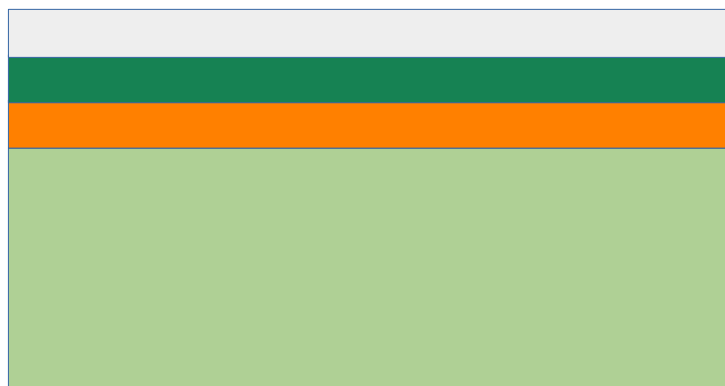
# Componenti di un PCB



**Substrato**  
(ad es. FR4)

*NB: non in scala. Stampato a singola faccia.*

# Componenti di un PCB



Copper

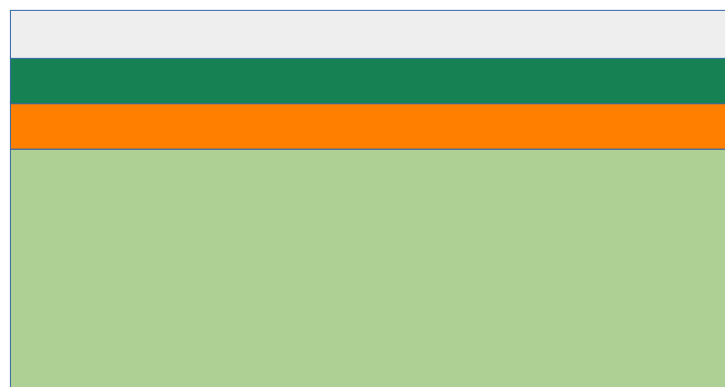
Substrato  
(ad es. FR4)

*NB: non in scala. Stampato a singola faccia.*





# Componenti di un PCB



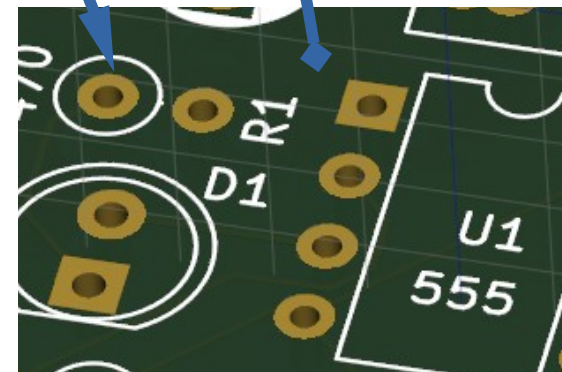
Soldermask (verde)

Copper

Substrato  
(ad es. FR4)

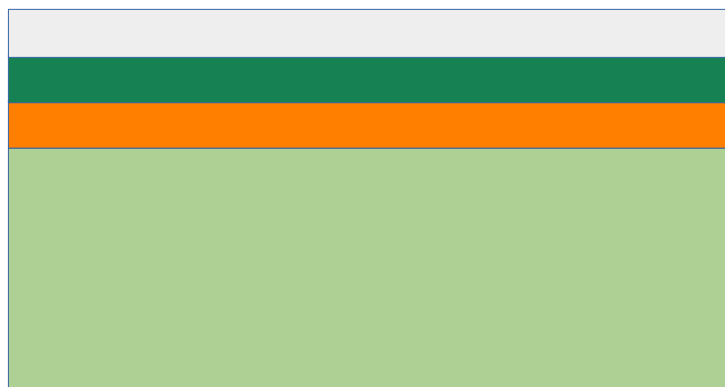
*NB: non in scala. Stampato a singola faccia.*

La soldermask si può avere di colore:  
verde, rossa, gialla, blu, viola, nera, bianca





# Componenti di un PCB



*NB: non in scala. Stampato a singola faccia.*

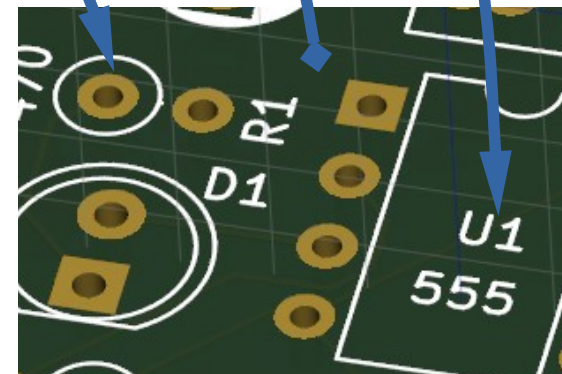
**Silkscreen**, le scritte (bianco)

**Soldermask** (verde)

**Copper**

**Substrato**  
(ad es. FR4)

La soldermask si può avere di colore:  
verde, rossa, gialla, blu, viola, nera, bianca







Ed ora creiamo un  
circuito stampato

# Astabile con 555



Realizzeremo il circuito stampato per la configurazione astabile del “mitico” 555 riproducendo lo schema riportato sul datasheet.

## 8.2 Typical Application

Figure 17 shows the schematic of the LM555 that flashes an LED in monostable mode.

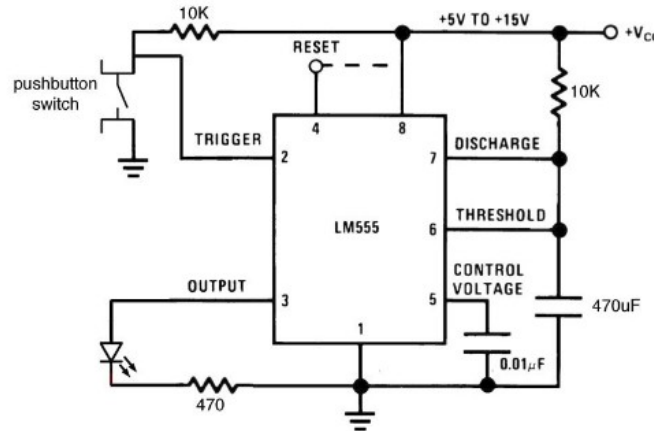


Figure 17. Schematic of Monostable Mode to Flash an LED





Passiamo a  **KiCad**



Base Material

FR-4

Flex

Aluminum

Copper Core

Rogers

PTFE Teflon

Layers

1

2

4

High Precision PCB

6

8

10

12

14

16

More

Dimensions

100

\*

100

mm

PCB Qty

5

Product Type

Industrial/Consumer electronics

Aerospace

Medical

PCB Specifications

Different Design

1

2

3

4

Delivery Format

Single PCB

Panel by Customer

Panel by Manufacturer

PCB Thickness

0.4

0.6

0.8

1.0

1.2

1.6

2.0

PCB Color

Green

Purple

Red

Yellow

Blue

White

Black

Silkscreen

White

Surface Finish

HASL(with lead)

LeadFree HASL

ENIG

High-spec Options

Outer Copper Weight

1 oz

2 oz

Via Covering

Tented

Untented

Plugged

Epoxy Filled & Capped

Copper paste Filled & Capped

Min via hole size/diameter

0.3mm/(0.4/0.45mm)

0.25mm/(0.35/0.4mm)

0.2mm/(0.3/0.35mm)

0.15mm/(0.25/0.3mm)

Board Outline Tolerance

±0.2mm(Regular)

±0.1mm(Precision)

Confirm Production file

No

Yes

Mark on PCB

Order Number

Order Number(Specify Position)

New 2D barcode (Serial Number)

Remove Mark

Charge Details

Special Offer

€1.82

Via Covering

€0.00

Surface Finish

€0.00

Build Time

PCB:

2 days

€0.00

24 hours

€6.64

24 hours

PCBA Only

€0.00

Calculated Price

€3.64

€1.82

Additional charges may apply for special cases

SAVE TO CART

Shipping Estimate

€1.38

Global Standard Direct Line

12-16 business days

Weight

0.29kg

Coupons

Save €27.27

Save €7.27

Welcome back


Write a message

Esempio di FabHouse



# Grazie

Paolo Cravero

X @pc74ls04 

Vi aspetto allo stand  
(abbiamo portato le Alpha!)

