MARCH 2023

Introduction to PCB design with Altium Designer

From Idea to Schematic to PCB

ebess

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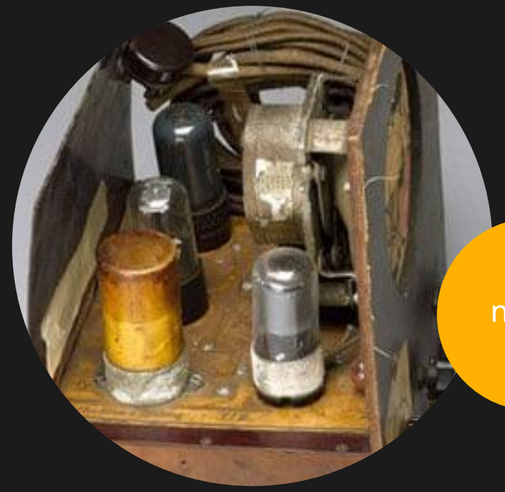
Agenda

- What is PCB?
- PCB Design Software
- The Schematic
- Help
- Next Steps

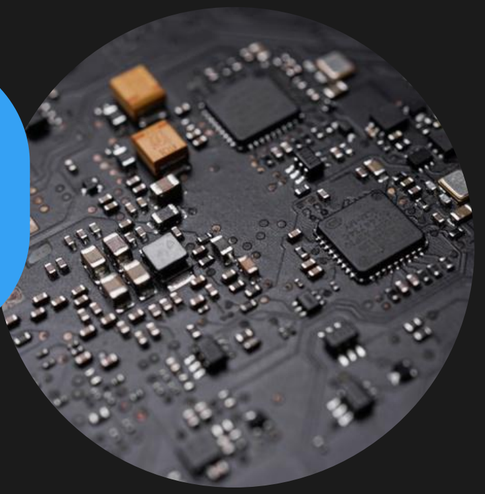
Printed Circuit Board

A board which connects electrical components in a circuit by using conductive tracks and layers as opposed to wires.



complex connection, manufacturing hurdles, debugging was difficult

provide electrical interconnections between components, a compact package that can be integrated into an end product.



Starting a New PCB Board Design

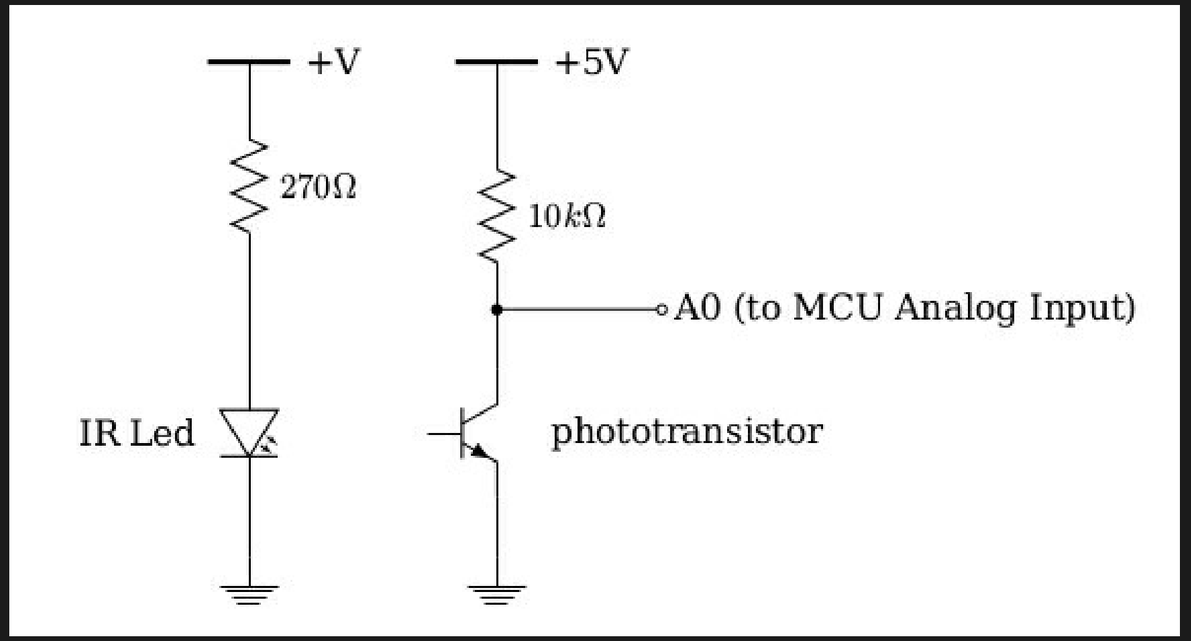
1. Understanding the Circuit
2. Schematic capture
3. Component placement/Part search
4. PCB stack-up
5. Routing/ Layering
6. Design review and verification
7. Preparing for Manufacturing

Softwares

- Altium is taught in METR2800 and ENGG2800

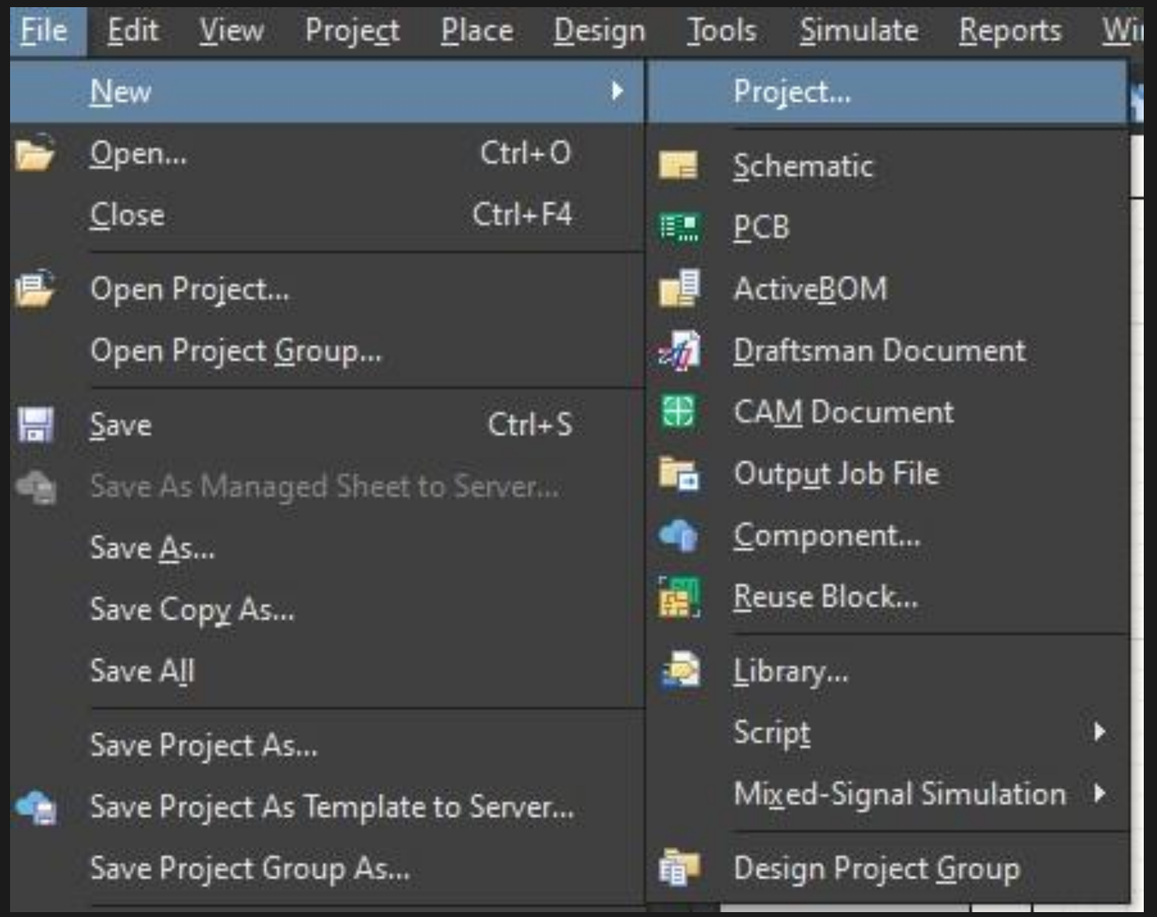
Understanding the Circuit

- IR LED and Phototransistor in Series.
- All ADC and voltage regulation are done within the chip.



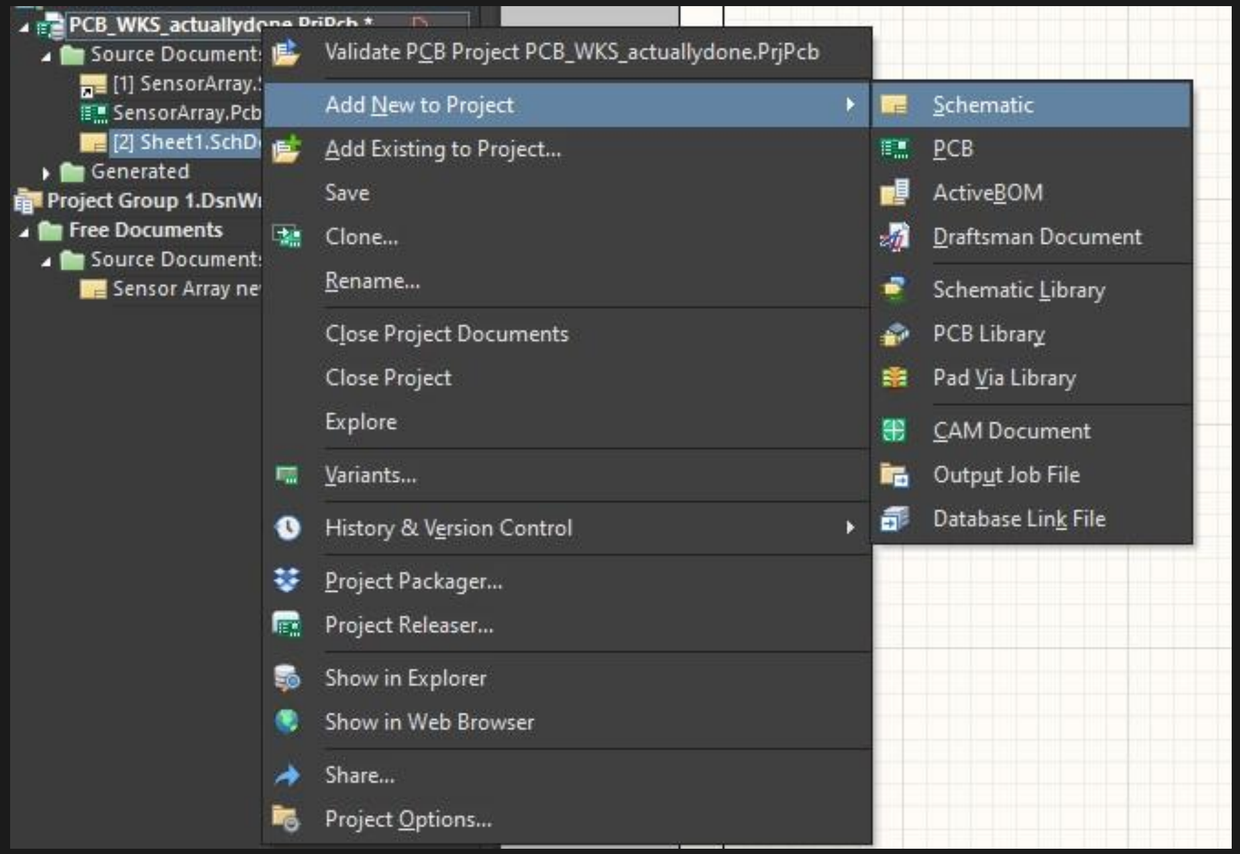
01

Creating a new project



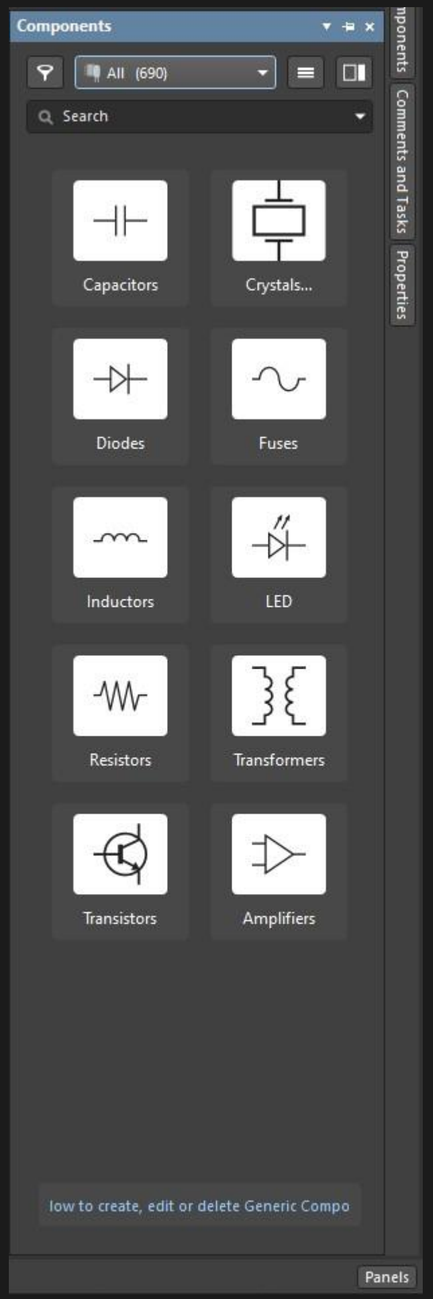
02

Creating a new schematic



03

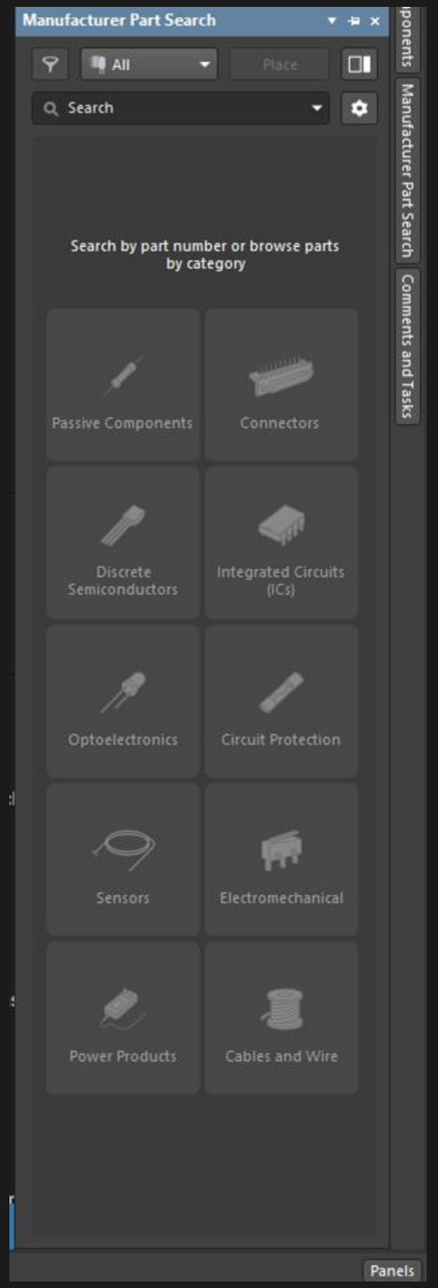
Placing components to the schematic

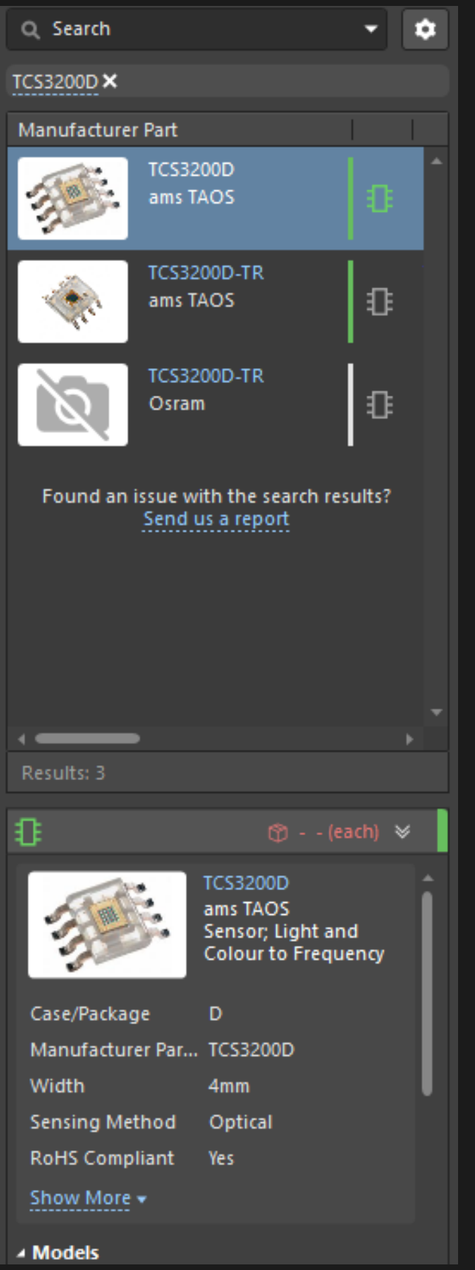


04
Manufacturer part search: (this will be interesting)

TCS3200D

QRE1113GR



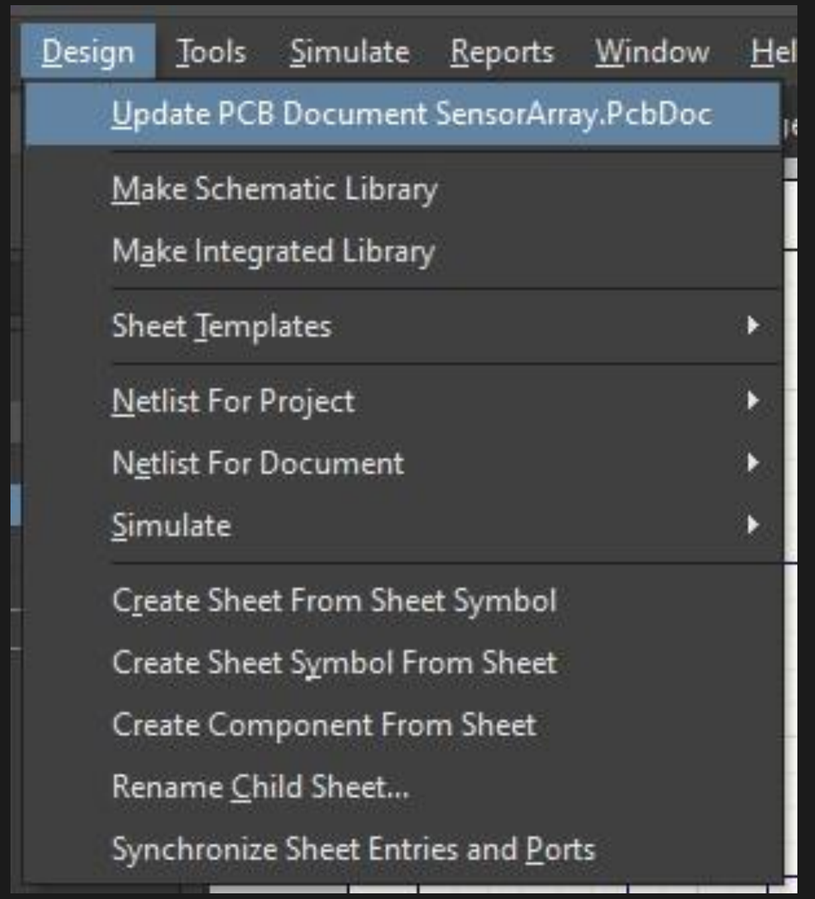


05

Add PCB to project

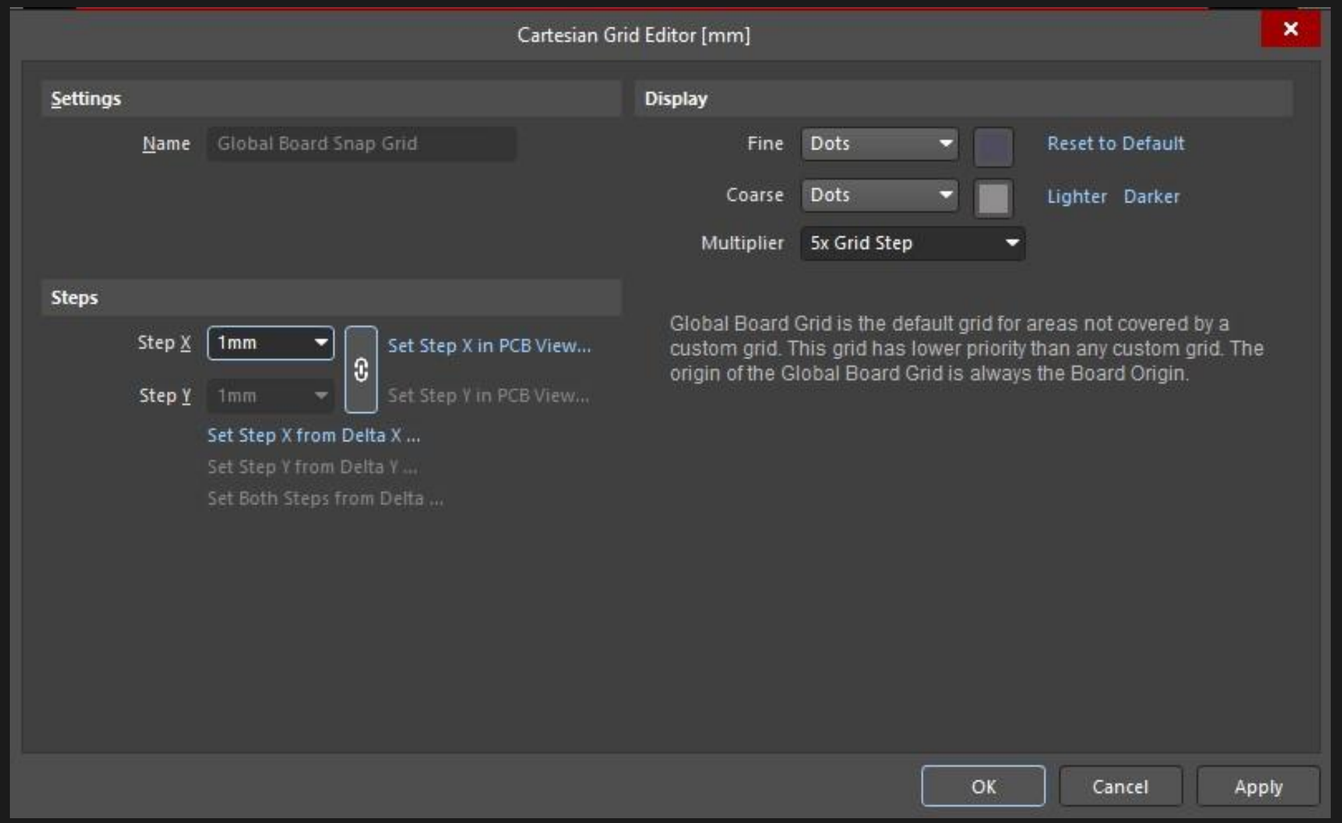
06

Updating PCB from Schematic



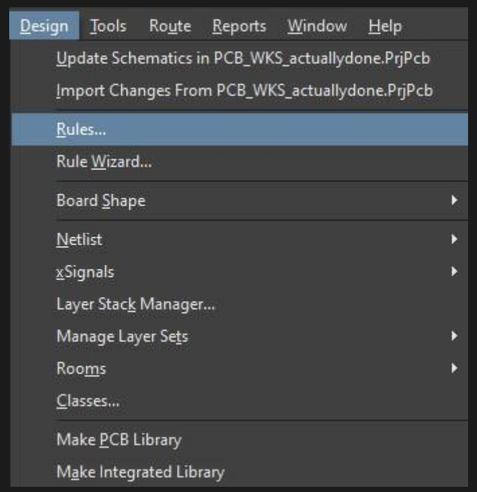
06

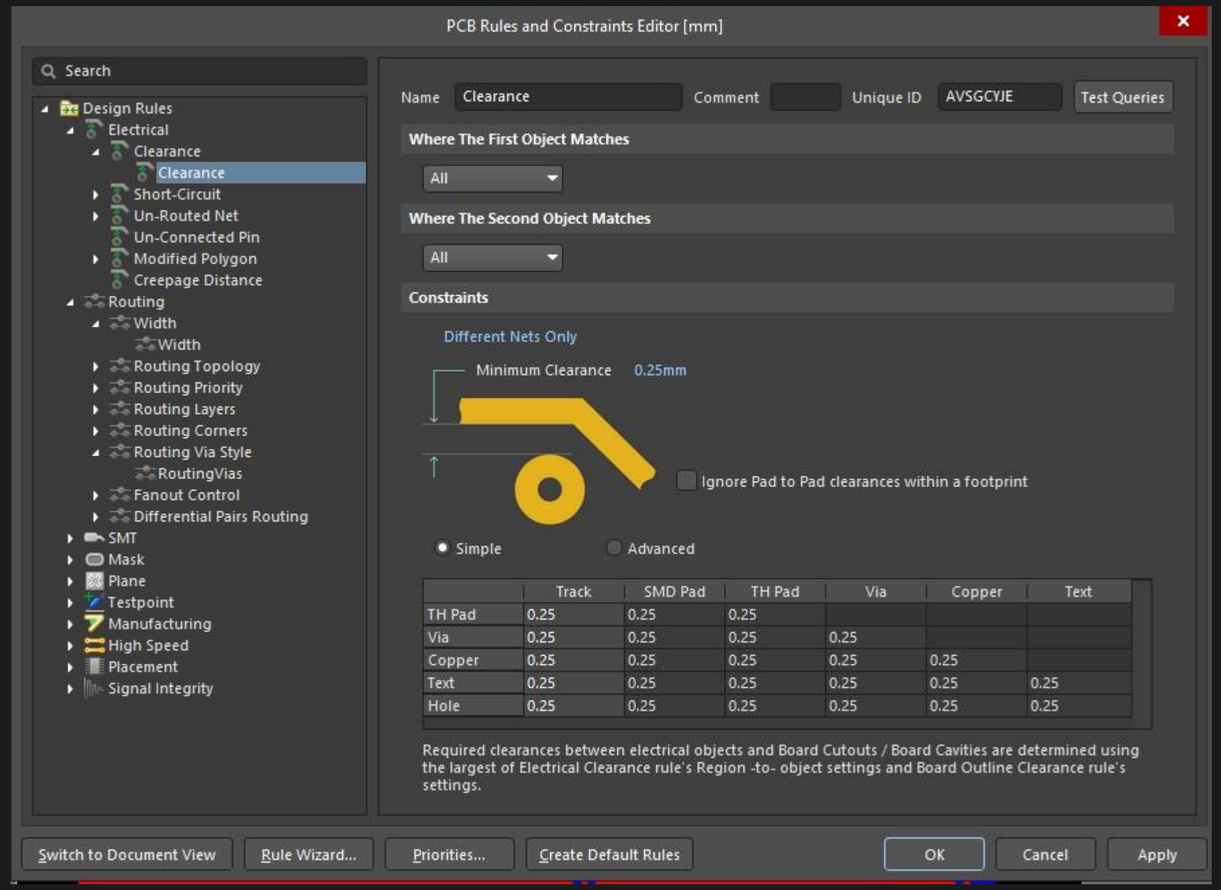
Cartesian Grid Editor: Ctrl + G



07

PCB Rules and Constraints Editor





PCB Rules and Constraints Editor [mm]

Search

- Design Rules
  - Electrical
    - Clearance
      - Clearance
    - Short-Circuit
    - Un-Routed Net
    - Un-Connected Pin
    - Modified Polygon
    - Creepage Distance
  - Routing
    - Width
      - Width
    - Routing Topology
    - Routing Priority
    - Routing Layers
    - Routing Corners
    - Routing Via Style
      - RoutingVias
    - Fanout Control
    - Differential Pairs Routing
  - SMT
  - Mask
  - Plane
  - Testpoint
  - Manufacturing
  - High Speed
  - Placement
  - Signal Integrity

Name: Width | Comment: | Unique ID: LPFSNCUM | Test Queries

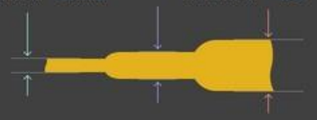
Where The Object Matches

All

Constraints

Preferred Width 0.254mm

Min Width 0.1mm | Max Width N/A



- (•) Check Tracks/Arcs Min/Max Width Individually
- ( ) Check Min/Max Width for Physically Connecte
- [ ] Use Impedance Profile

Min Width	Preferred Width	Max Width	Layer Name
0.1mm	0.254mm	0.254mm	1 - Top Layer
0.1mm	0.254mm	0.254mm	2 - Bottom Layer

Switch to Document View | Rule Wizard... | Priorities... | Create Default Rules | OK | Cancel | Apply

PCB Rules and Constraints Editor [mm]

Search

- Design Rules
  - Electrical
    - Clearance
      - Clearance
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    - Fanout Control
    - Differential Pairs Routing
  - SMT
  - Mask
  - Plane
  - Testpoint
  - Manufacturing
  - High Speed
  - Placement
  - Signal Integrity

Name: RoutingVias | Comment: | Unique ID: IABCUSCG | Test Queries

Where The Object Matches

All

Constraints

Min/Max preferred

Via Diameter
Minimum 1.27mm
Maximum 1.27mm
Preferred 1.27mm

Via Hole Size
Minimum 0.711mm
Maximum 0.711mm
Preferred 0.711mm

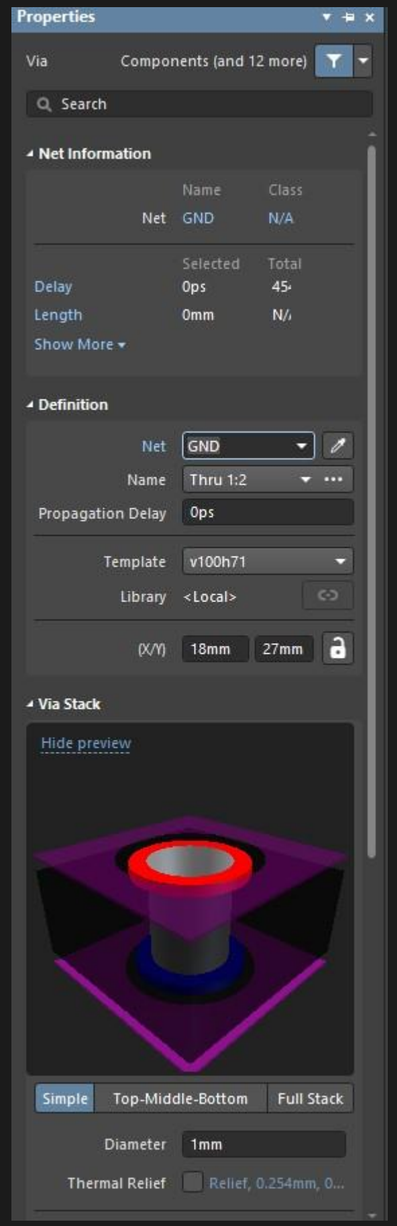
Switch to Document View | Rule Wizard... | Priorities... | Create Default Rules | OK | Cancel | Apply

08

Layer Stack

09

Properties Panel



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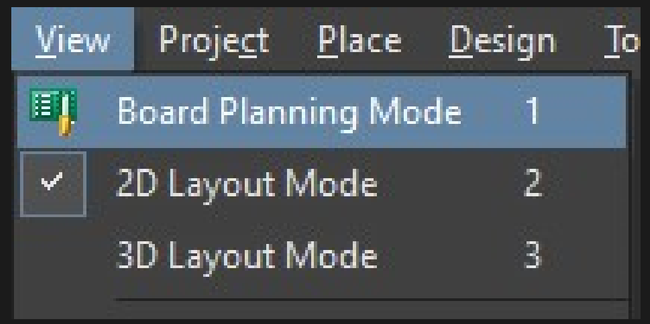
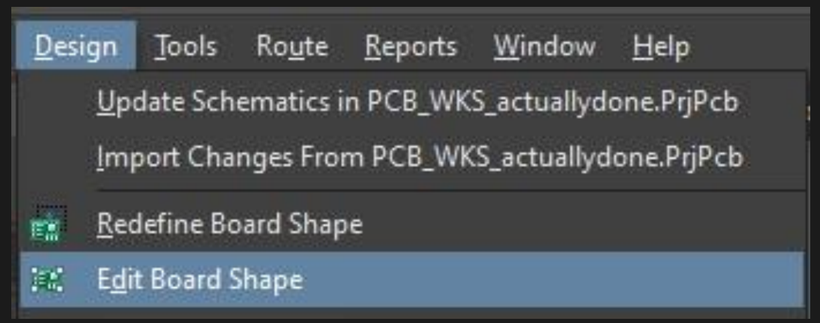
Board Planning Mode

1

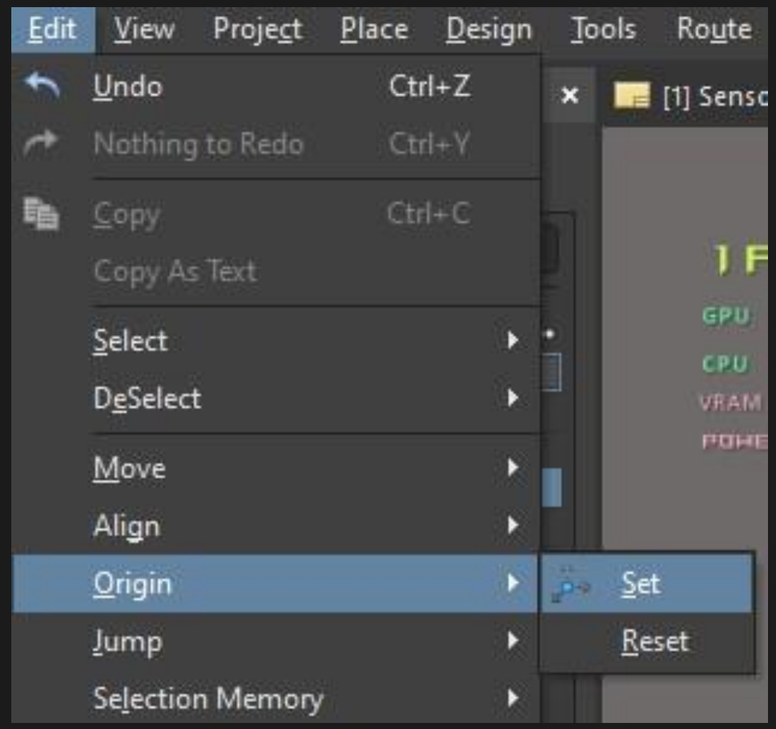


2



11

Set / Reset Origin



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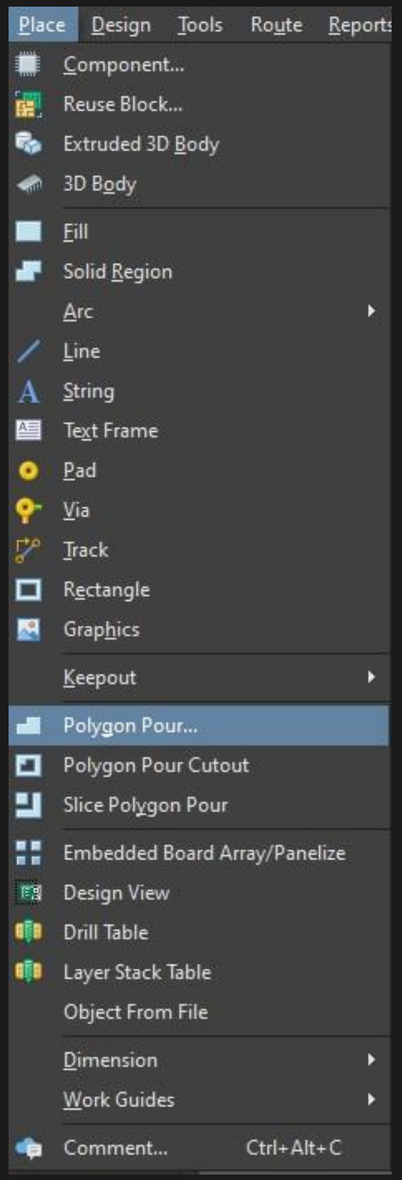
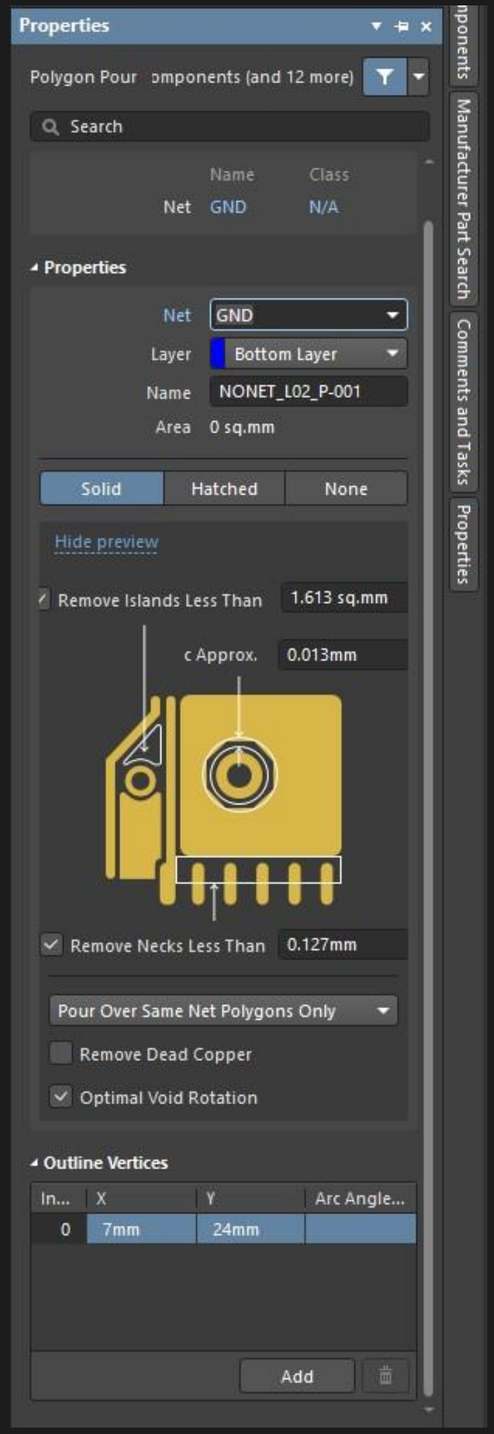
Polygon Pour





Polygon pours are used to create a solid or hatched (lattice) area on a PCB layer, using either Region objects or a combination of Track and Arc objects

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