

HARDWARE ROADMAP

From Idea to Manufacturing

MODULE 3

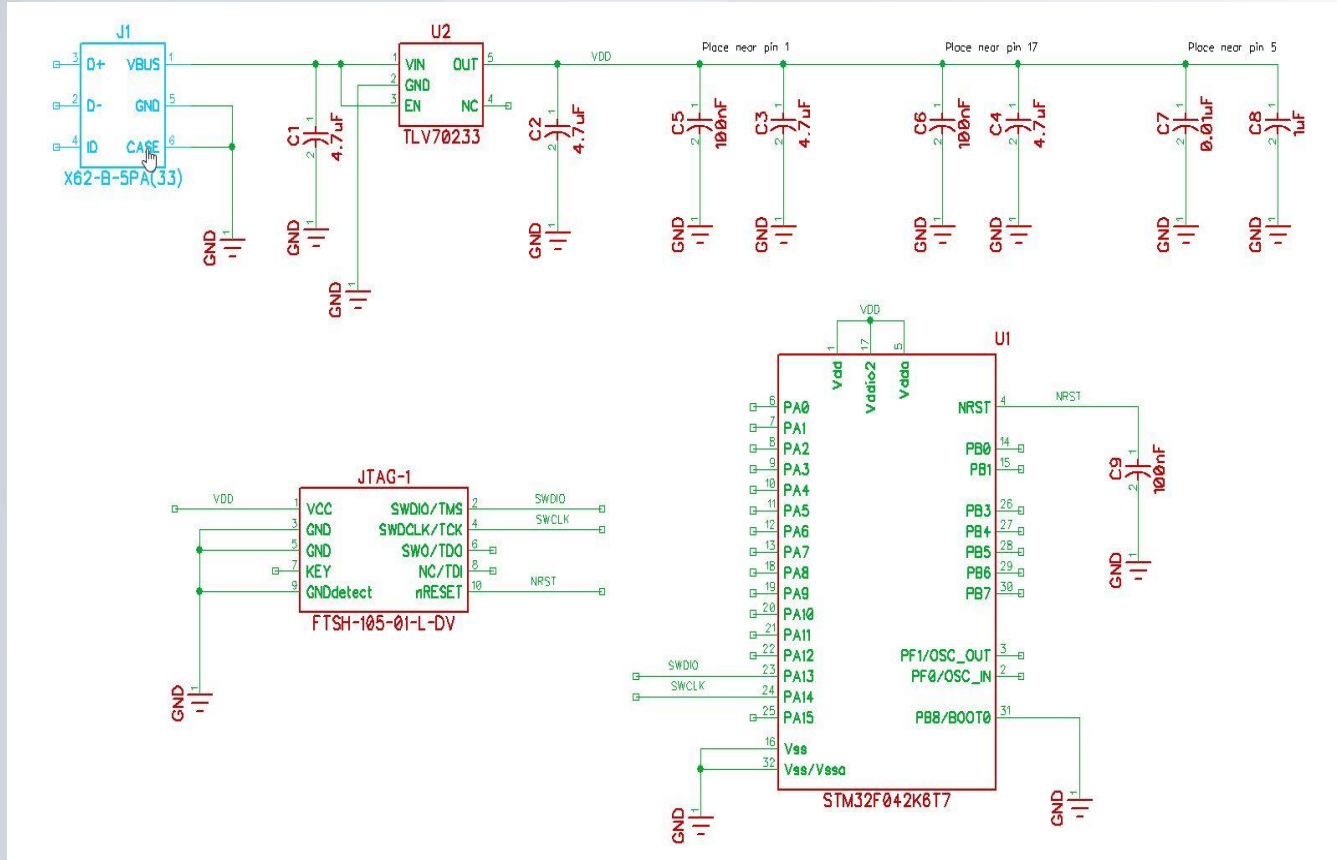
PRODUCT DESIGN STAGE

Step 6

Design the Schematic Circuit Diagram

Step 6

Design Schematic Circuit Diagram



- Conceptual diagram like a blueprint
- Interconnection of all electronic components
- Dozens of software packages for designing schematics and PCB

Step 7

Create the Bill of Materials (BOM)

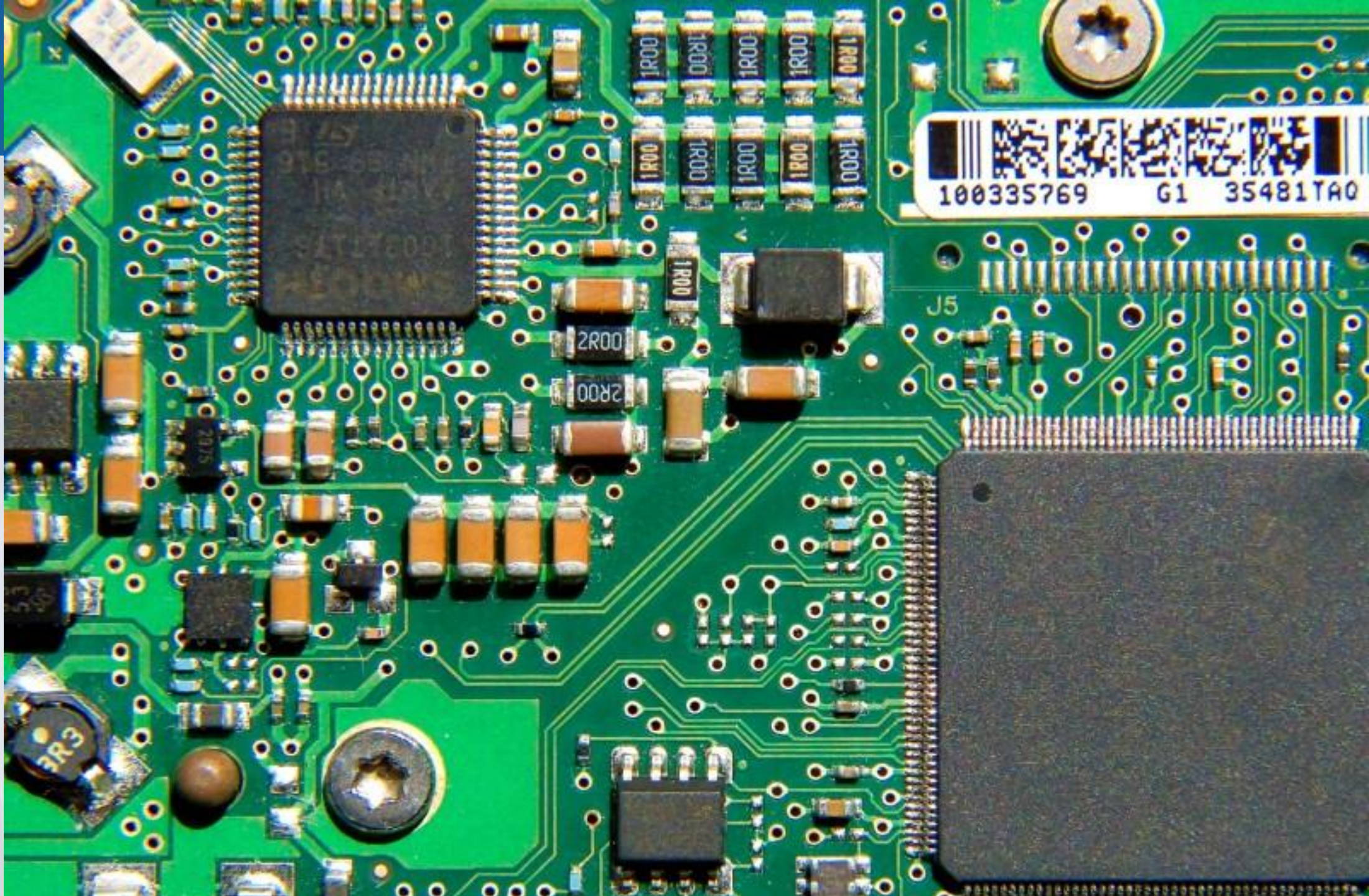
- Automatically created by schematic software
- Include all part numbers in schematic
- Use BOM for calculating manufacturing cost
- Excel/Sheets vs BOM software

Step 8

Design the Printed Circuit Board (PCB)

- Physical board that holds and connects electronic components
- Stacked routing/component layers separated by insulation layers
- Created in same software as schematic
- High power, wireless, audio, and processors most complex to layout

Step 8



Step 9

Develop the Software

- Embedded firmware (low-level, C/C++, EE)
- Mobile application (high-level, CS)
- Computer software (high-level, CS)
- Cloud programming (high-level, CS)

Step 10

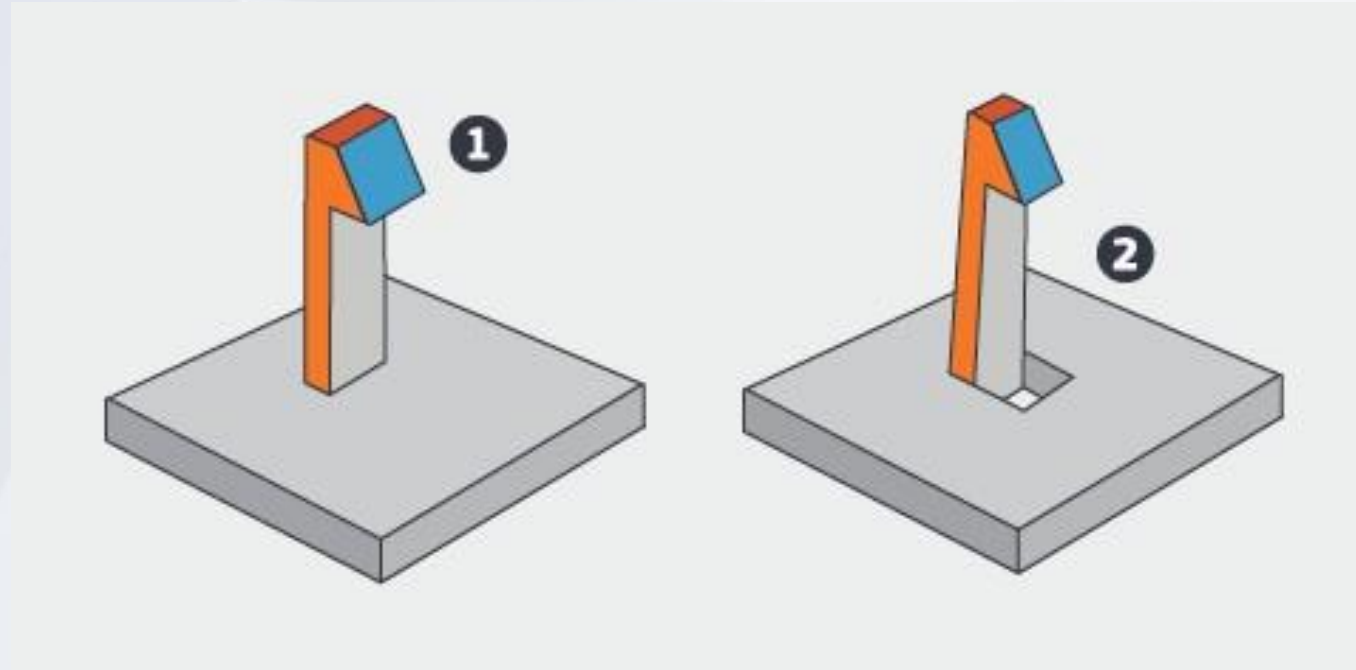
Design the Enclosure/Case

- Prototypes = 3D printing or CNC machining
- Production = High pressure injection molding
- Designing for injection molding
 - Consider from the start of the design
 - Finalize after final prototype

- Undercuts
- Draft
- Ejector pin marks
- Uniform wall thickness
- Radius/chamfer corners
- Parting line

Step 10

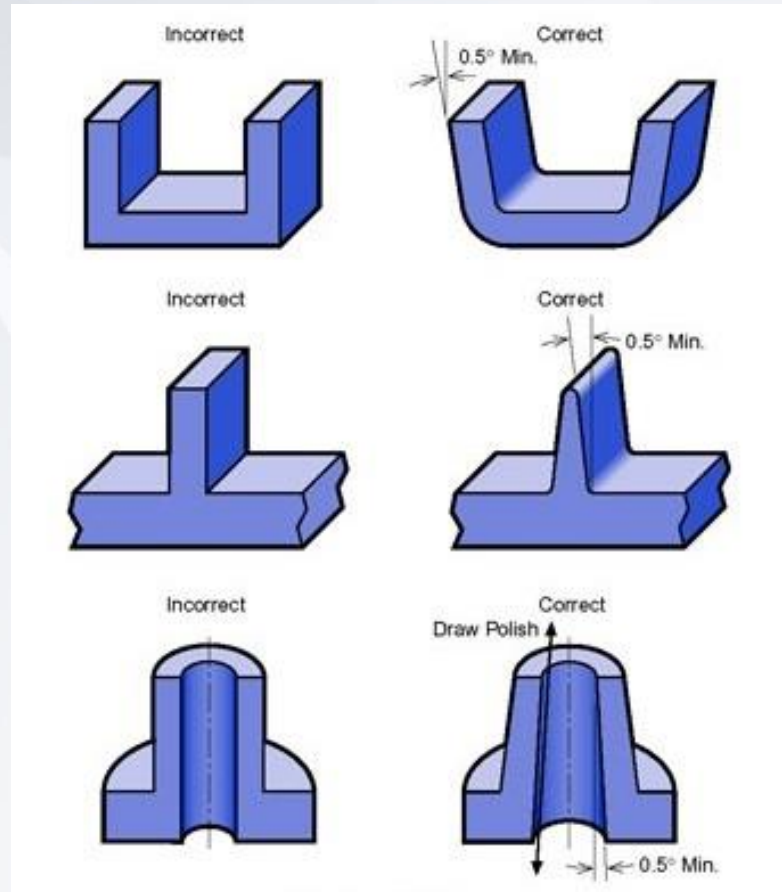
Design the Enclosure/Case



Avoid undercuts when possible to simplify mold and lower cost.

Step 10

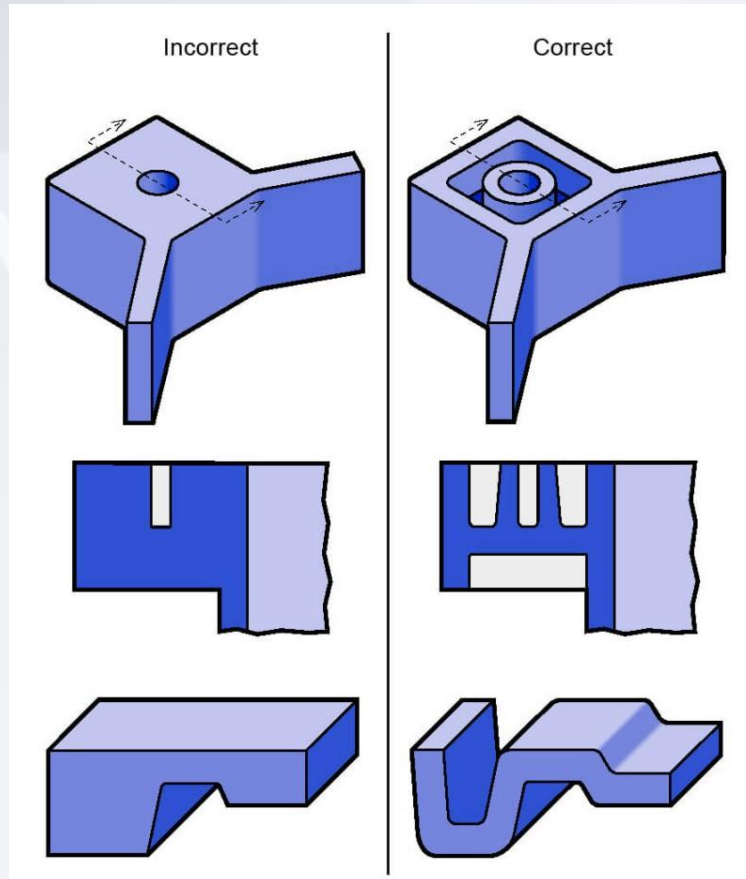
Design the Enclosure/Case



Draft is required to remove part from mold.

Step 10

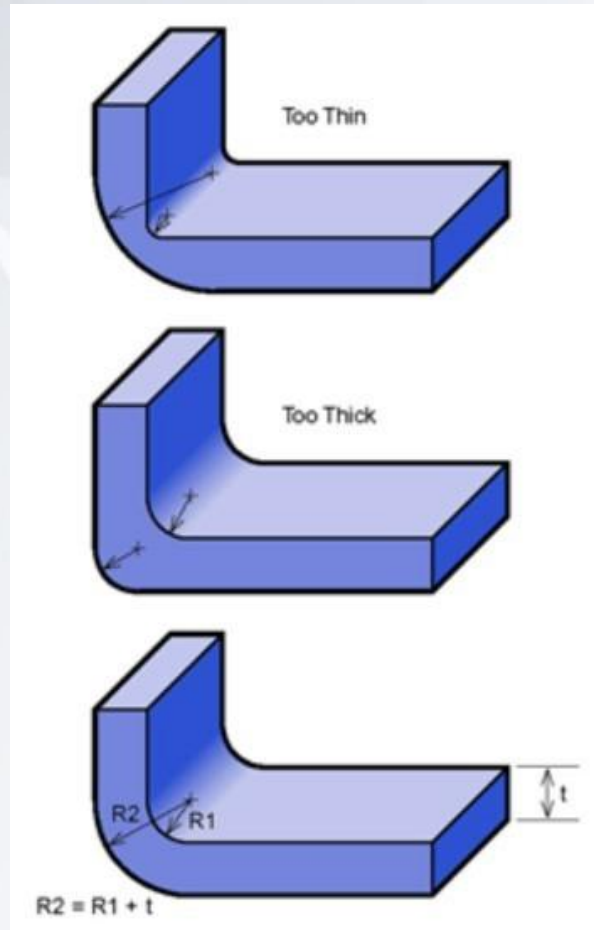
Design the Enclosure/Case



Uniform wall thickness is important for injection molding.

Step 10

Design the Enclosure/Case



Corners must be rounded while maintaining uniform thickness

Step 11

Get Independent Design Reviews

- Reviews reduce design errors
- All established tech companies require reviews
- Saves money and speeds up time to market
- Review both electronics and mechanicals