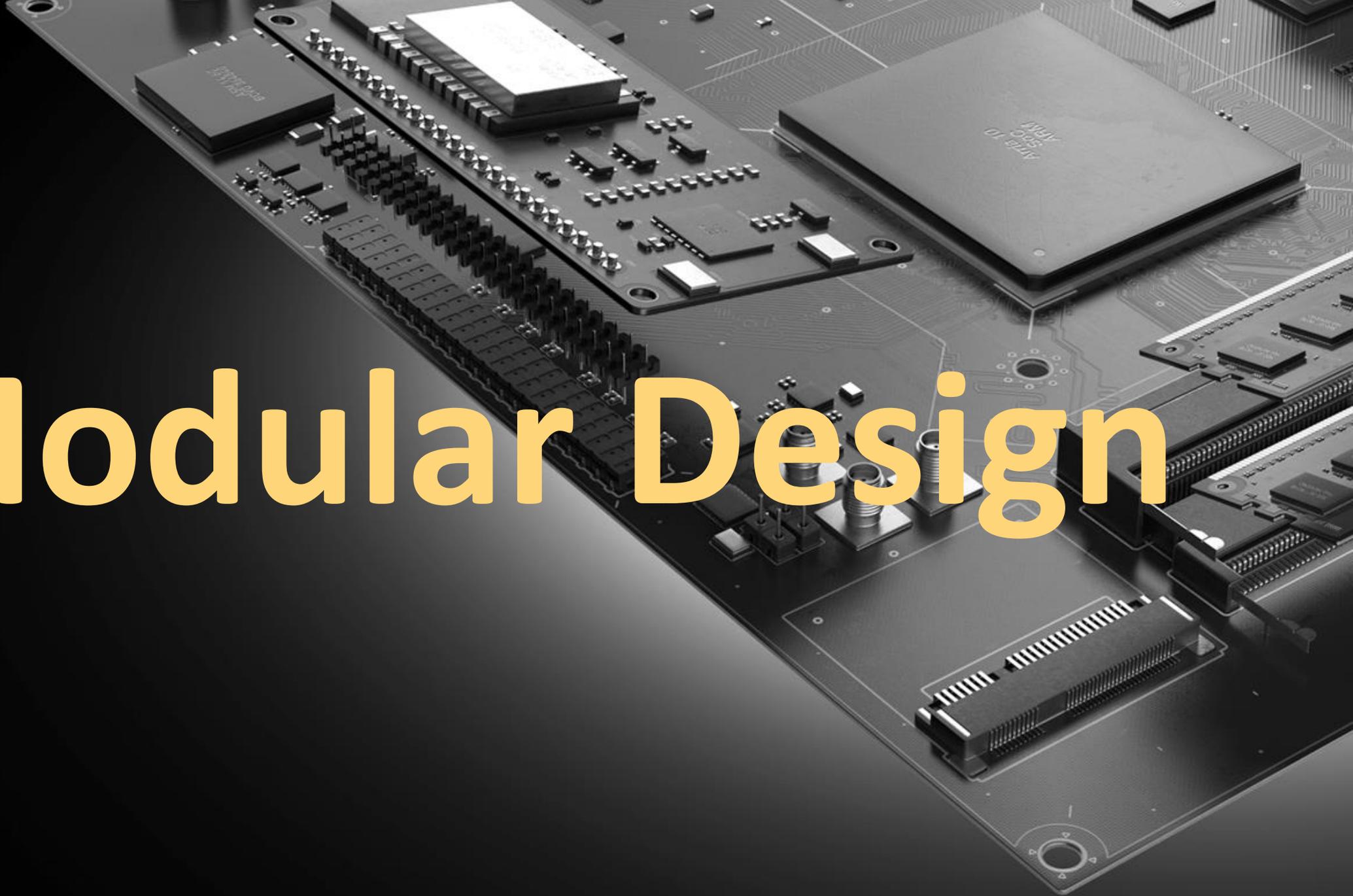


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Modular Design





1. HOW TO USE A MODULAR APPROACH TO SIMPLIFY YOUR PCB DESIGN PROCESS
2. MODULAR APPROACH TO PCB DESIGN FOR INTERNET OF THINGS APPLICATIONS
3. MODULAR DESIGN TIPS FOR OBSOLESCENCE MANAGEMENT

1

Modular approach to simplify PCB Design Process

Modular approach to simplify PCB Design Process

PCB design can end up taking more time if it is not planned out properly when moving from conceptual spec to actual design.

Break the Mountain Down into Steps – To get design started, find areas in the design that are self-contained or have a well-understood interface. These sections will eventually need to be designed in detail, but in the beginning, we only need to identify their presence on the board. Many of the actual components we use in our designs are black boxes for two reasons:

- They present a well-defined interface in their pinouts and specs.
- We know that their performance is predefined and specific to their interface.



Modular approach to simplify PCB Design Process

PCB design can end up taking more time if it is not planned out properly when moving from conceptual spec to actual design.

Repeat the following steps until the design concept is simple enough to complete

- Find a subsystem or functional group you can modularize
- Identify all the components that are part of the group
- Identify the inputs and outputs (i.e. the interface) of the group
- Create a black box to represent the group and its interface
- Substitute the black box for the identified components in your design



Modularization Tools and Techniques

- **Drawing Tools** – Use the drawing tools to place shapes on your board. Also use the line drawing tool to show connections to other parts of the design.
- **Custom Components** – Some design software let define custom components in case everything needed in their component libraries are not found. Define the electrical properties of the component accurately enough to include it in a working schematic.
- **Notes** – Use text to represent black box, or add written text to a drawn shape. It may also be helpful to annotate why this placement was made and to define the black box's intended function.
- **To-do's** – To-do items should be available anywhere in a project. They can be assigned to an owner, categorized, and marked as complete when they are done.



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2

Modular approach to PCB Design for Internet of Things Applications

Modular approach to PCB Design for Internet of Things Applications

Adopting a modular design for IoT PCBs will help design more efficiently, and reduce manufacturing costs for PCBs.

Optimizing Workflow

- Design** – Most IoT things will include fairly predictable features that use predictable components. Instead of designing a separate PCBs, make one that does both.
- Tailoring** – Make some alterations so the basic board will work. However, it's often easier to change an existing board than to make an entirely new one.
- Testing** – It's much easier to test 20 of the same board than to test 20 unique boards.
- Sales** – Make the design standardized, like Arduino's, embedded systems engineers will choose it simply because they already know how it works.



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Modular approach to PCB Design for Internet of Things Applications

Adopting a modular design for IoT PCBs will help design more efficiently, and reduce manufacturing costs for PCBs.

Optimizing Cash Flow – Optimization in the design process automatically translates to cost savings in man hours. Time not spent rehashing the same old designs is time spent designing boards for new useless products. Another major cost saving area is in board manufacturing. The more similar your PCBs are, the less they'll cost to manufacture.



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3

Modular Design Tips for Obsolescence Management

Modular Design Tips for Obsolescence Management

Migrating to a new microcontroller can be a painful process that involves close coordination between hardware and firmware developers.

•**Modularize Schematics Designs to Minimize Changes** – If hardware redesign is required for MCU migration, modular schematics can save lots of time. A modular schematic design is a far better option that provides the flexibility of organizing the microcontroller on single schematic sheets and using nets or ports to connect to other modules.

•**Develop Portable Code for Easy Migration** – Creating good code is more than just crunching pages upon pages of programming instructions and getting the hardware to work. When transitioning to a new microcontroller, only the source code related to the internal portion of the microcontroller needs to be modified. This approach minimizes the time needed to amend the firmware to suit the new microcontroller.

•**Choose Pin-Compatible Microcontrollers to Save Time** – Ensuring efficient PCB layout can be the most efficient way to save time and energy when migrating to new microcontrollers. It is wise to check with the manufacturer if the obsolete microcontroller requires a pin-to-pin replacement.



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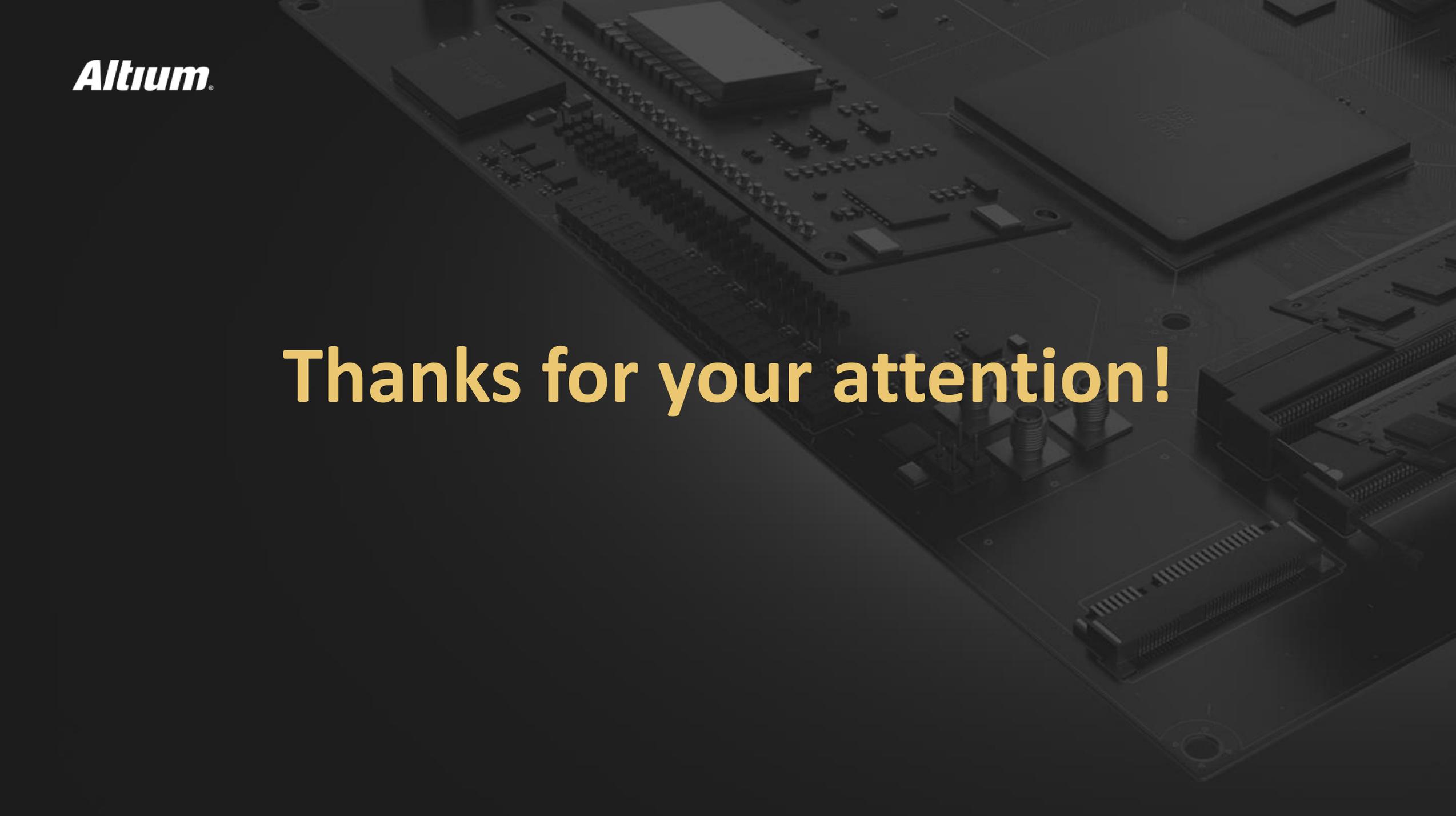
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