

## **ELECTRONICS DESIGN**





**COMPONENT SELECTION** 



POWER ELECTRONICS



**PCB LAYOUT** 



**MOTOR DRIVES** 



**DESIGN REVIEW** 



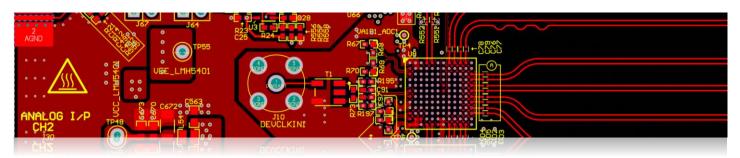
EMC/EMI



**DESIGN VERIFICATION** 



#### **HIGH-SPEED DIGITAL**



When pushing clock rates and rising edge times of digital signals, a whole slew of challenges comes with it. At BuildEmber, we know how to design and apply the appropriate constraints to ensure the small details don't slip through the cracks.

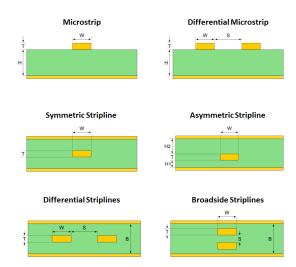
#### Signal Integrity

High-speed interconnects require proper definitions of transmission line structures for signal integrity. Properly defining geometries, impedance matching, designing a stackup, and verifying the stackup with a PCB manufacturer are all critical steps to ensure reliable designs. Ensuring a consistent transmission line structures are built prevent poor signal integrity due to impedance mismatch.

# Length Matching

Timing is critical when high-speed buses clock data for read and write operations. Incorrect length matching between bits and bit groups can cause incorrect data to be transmitted.

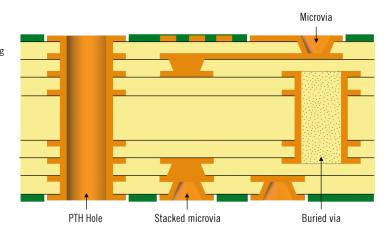
Whether you need length matching on differential pairs, or between byte groups in data buses, we've got you covered.



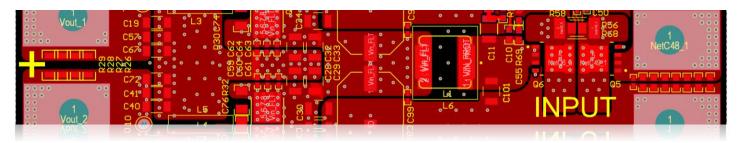
#### **High-Density Interconnect Design**

Modern PCB technology allows for extremely dense PCB layouts. Properly using technologies such as blind, buried, and microvias in a multi-lamination cycle PCBs result in high density layouts.

Although multi-lamination boards are more expensive, if small form factor is what you need, these PCB technologies can provide the size solutions you need.



#### **POWER ELECTRONICS**



#### **DC/DC Converters**



DC/DC converters are the heart of every power electronics system. If you're exploring new topologies whether isolated or non-isolated, proper care needs to be taken to ensure components are not electrically overstressed and control loops are properly compensated. We have experience with the following DC/DC converter concepts:

- Non-Isolated Converters (low-voltage and high-current point of load, load regulation, multi-phase converters)
- Isolated Converters (forward, full bridge, flyback, etc.)
- Loop Stability (Bode plot generation and loop gain tuning)

Our engineers have years of experience performing worst-case analysis for DC/DC converters and can guarantee your design works across wide operating temperatures, input voltage, load currents, component tolerances, and bias effects.

#### Fault Isolation, Power Distribution, and Redundancy

Some systems may require extra levels of robustness in their power delivery network. Part of this includes isolating faults so they don't propagate throughout the system as well as redundancy. If you have a system that requires redundant design due to uptime requirements, we can make that happen.

#### **Motor Drives**

BuildEmber has experience with PCB layout and design of brushless motor drivers as well as stepper motors. Our devices have been successfully implemented in oil and gas projects, handheld power tools, and various other machinery.

### **Our Approach**

- ✓ DC/DC Converter Current Limits
- ✓ E-Fuses & Fuses
- ✓ Solid-State Circuit Breakers
- ✓ Redundant Fallback
  - OR-ing FETs

#### **ELECTROMAGNETIC COMPTABILITY / INTERFERENCE (EMC/EMI)**



**CONDUCTED EMISSIONS** 



**RADIATED EMISSIONS** 



**CONDUCTED SUSCEPTIBILITY** 



**RADIATED SUSCEPTIBILITY** 



#### **ELECTROSTATIC DISCHARGE (ESD)**



#### LIGHTNING INDUCED



#### We Check For

- ✓ Unintended Radiators
- ✓ DC/DC Input Filters & Power Factor
- ✓ Performance To Interference
- ✓ Differential & Common-Mode Noise
- Proper Shielding and Grounding

# Electromagnetic Compatibility (EMC) is an often-overlooked aspect of product design. Proactively addressing EMI culprits at different levels early in the project will ensure a successful project.

Poor management of EMI can often lead to problems and malfunction of hardware when system components are integrated together.

#### **COMPONENT SELECTION**



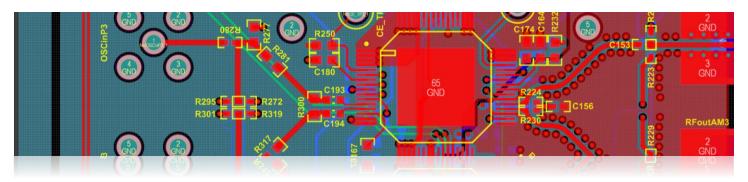
There are many components to choose from when incorporating them into your design. At BuildEmber, we consider a multitude of characteristics about a component to ensure it's the right fit for your design.

We take the approach of determining design constraints to properly choose components. Whether it's cost, reliability, accuracy, etc., these types of questions are ultimately the driving factors for component selection.

#### We Consider

- Operating Temperature
- ✓ Bias Effects on Components
- ✓ Material Directives Requirements
- ✓ Component Deratings
- ✓ Parameter Drift
- ✓ Cost

#### **SCHEMATIC & PCB LAYOUT**



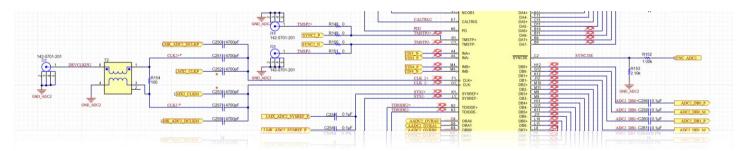
Armed with industry standards, BuildEmber is equipped to tackle your PCB layout needs. We've got a breadth of experience in many different fields including industrial, aerospace, instrumentation and data acquisition, downhole electronics, and many more. PCB layout is an ever-evolving field, so don't let the pitfalls of signal integrity, power integrity, manufacturability, and assembly catch you off guard.

A proper PCB layout can prevent a myriad of issues such as electrical overstress, EMC failures, improper assembly, and lost time for your business.

#### **Our Deliverables**

- ✓ Schematic & PCBA Variants
- ✓ Bill of Materials (BOM)
- ✓ Fabrication & Assembly Drawings
- ✓ ODB++ & Gerber Files
- √ Fabrication & Assembly Quotes
- ✓ Support For Manufacturing & Assembly

#### **DESIGN REVIEW**



Design review is a critical aspect of project planning. Having a thorough review allows for products to get to production with fewer PCB fabrications and assemblies which translates directly to time to market.

The effort put in here has a multiplier effect on the likelihood of the success of a project. Our engineers have designed and built hardware where failure is not an option. If there are any reservations about whether a design will work, a second opinion is always a good choice.

#### We Check For

- Requirements Definition
- ✓ Worst-Case Analysis
- ✓ Schematic Symbols and Footprints
- ✓ Logic Compatibility
- ✓ Electrical Overstress
- ✓ EMC/EMI Mitigation

#### **DESIGN VERIFICATION**



#### What's Included

- ✓ Specification Verification
- ✓ Requirements Verification Matrix (RVM)
- ✓ Oscilloscope Waveforms
- ✓ Design Verification Report
- ✓ Address Known Shortcomings

To verify your product is working as designed, we utilize on-the-bench testing to verify performance and functional design.

Let us take your product and run it through the ringer. Whether you have a product that you suspect has issues, or there are unknowns, we will find them and make you aware. We know how to properly test your hardware and find any potential issues.

#### **CONTACT US**



Schedule a time to discuss your project needs. Our experienced team members are ready to discuss your project.

**Phone** 



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Email



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