American Standard Circuits
Sunstone Circuits

AMERICAN STANDARD CIRCUITS THERMAL MANAGEMENT SOLUTIONS

Discover ASC's commitment to close collaboration with their customers, showcasing how obstacles seamlessly transform into opportunities and long term solutions.

USE CASE SUMMARY

In today's rapidly evolving electronics industry, the demand for high-performance, multi-functional devices has increased significantly. Engineers are often faced with the challenge of integrating diverse technologies into a single, cohesive design. This whitepaper explores how American Standard Circuits tackled a complex design issue for a customer requiring an extreme application of mixed technologies, emphasizing the importance of selecting a PCB fabricator with world-class engineering support and extensive experience

CHALLENGE

One of our customers presented us with the task of solving a complicated design issue involving the integration of RF, digital and thermal management technologies within a single PCB. The application demanded the use of mixed technologies, including RF microwave materials and traditional FR-4, within a rigid-flex metal-core structure. The goal was to deliver a high-performance PCB capable of meeting stringent operational requirements while maintaining cost-effectiveness and manufacturability.

SOLUTION

The solution required a phased approach, leveraging ASC's engineering skills and cutting-edge PCB fabrication capabilities.

PHASE 1

- **FR-4 and RF Materials**
  The existing design consisted of the top 4 layers using RF microwave materials from Rogers with 8 layers of FR-4 digital materials on the bottom with no flex component.
- **Copper Metal Core**
  A copper metal core was included for improved thermal management and structural integrity.
- **Vias**
  Blind and buried vias were used on both the RF and FR-4 portions along with through vias that were insulated from the copper metal core. Standard

American Standard Circuits
475 Industrial Drive
West Chicago, IL 60185

sales@asc-i.com
asc-i.com

PHASE 2

To address subsequent updates and connector changes, the design was evolved into a rigid-flex metal-core board:

- **Rigid-Flex Integration**

  The top 8 layers were converted to 4 layers of Rogers RF materials and 8 layers of digital FR-4 that included the layers 7 and 7 rigid-flex portion designated for flexibility.

- **Bonding**

  The top and bottom subassemblies were bonded to the copper metal core using thermally conductive prepreg, ensuring effective thermal dissipation. This resulted in what we call the Kitchen Sink Board as we have RF materials on the , a metal core in the middle and digital RF-4 on the bottom all tied together with thermally conductive prepreg.

- **Vias**

  The design retained the use of blind and buried vias on both the RF and FR-4 rigid-flex portions, with insulated vias through the copper metal core.

RESULTS

The meticulous planning, rigorous engineering efforts, and close collaboration with the customer yielded impressive results. After hundreds of engineering hours and before we ever saw a PO or got a commitment from the customer, we ran the first qualification build which achieved a 95% yield, demonstrating the effectiveness of the chosen design and manufacturing strategies.

CONCLUSION

This case study highlights the critical importance of selecting a PCB fabricator with extensive experience and top-tier engineering support when tackling complex design challenges involving mixed technologies. ASC's phased approach, leveraging advanced materials and meticulous engineering processes, enabled the successful integration of RF and digital technologies into a high-performance, reliable PCB. By choosing Sunstone, customers can expect streamlined processes, enhanced product quality, and long-term cost benefits.