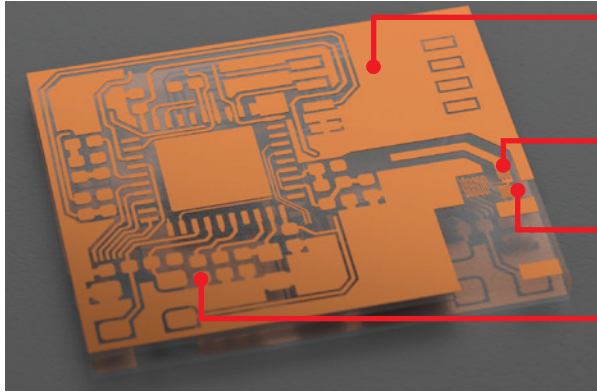


APEX[®] GLASS

RF SYSTEM-IN-PACKAGE (SiP) SOLUTIONS



1) Perimeter TGV

Through-glass via (TGV) for grounding and shielding; minimizes EMI.

2) High-Q Inductor

Custom-designed inductor with High-Q performance.

3) High-Q Capacitor

Custom-designed capacitor with High-Q performance.

4) Assembly Solutions

Packaging solutions available for a variety of assembly approaches including wire bond, SMT, flip-chip, and stud bumping.

Solution Overview

Glass-based RF SiP interposers allow you to offer significant product differentiation. Our proprietary APEX[®] Glass allows you to realize high-value system integration in the most compact footprint, enabling you to meet even the most demanding product definitions for next-generation RF and wireless products.

At the heart of our interposer technology is the ability to manufacture precise TGVs. With micron-scale precision, TGVs are manufactured at 50 microns in diameter for I/Os with tight metal redistribution line and spacing at less than 30 microns. Additionally, the in-glass manufacturing of integrated passive devices, such as inductors and capacitors, enable advanced RF performance.

3DGS offers “build-to-print” glass-based RF SiP interposer devices that are customized for your specific product needs.

Key Benefits

- Heterogeneous integration (HI), enabling the packaging of digital IC, analog IC, RF IC, and MEMS into a common package
- Reduce chip size by 70% compared to PCBs
- Up to 20% reduction in power utility
- More than a 50% increase in wireless bandwidth
- Wideband applications ranging from DC to 100 GHz
- Embed passive devices (e.g. inductors, capacitors, baluns, antennas, etc.) into the package
- Lower cost of ownership by minimizing assembly costs
- Reduce time to market



1-505-916-5590



3DGSinc.com



Enabling the GHz Generation

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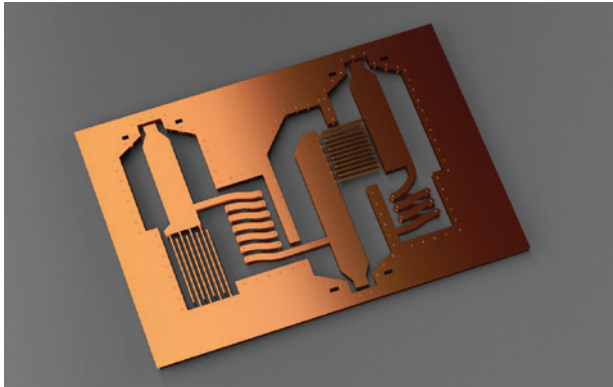


Figure 1. Lumped-Element RF Filter

Our APEX® Glass provides the highest systems-level integration of passive and active devices for your RF SiP products compared to any other packaging technology available today.

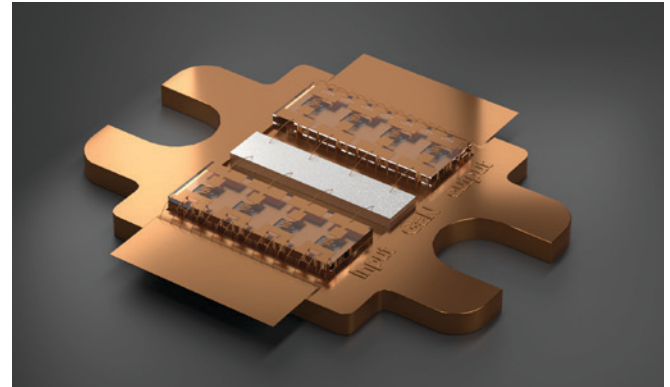


Figure 2. IPD Matching Networks

SiP assembly options are customizable to the application. Standard die integration approaches, such as direct mount utilizing SMT processes, wire bonding, and flip-chip assemblies, are easily accomplished with 3DGS 2.5D SiP products.

Common Applications

- Wireless handheld and infrastructure devices
- High-frequency, high-performance RF devices
- 400 GB/sec and 600 GB/sec optical transceiver electronic packages
- MEMS sensor packages
- Internet infrastructure components
- Integrated photonic components
- Heterogeneous integration electronic packages

Design Limits

| PARAMETERS | TYPICAL | PERFORMANCE LIMIT |
|---------------------------------|---------------------------|---------------------------|
| Size | < 5 mm x 5 mm | < 40 mm x 40 mm |
| Height | 300 μm | > 150 μm |
| TGV Diameter | > 50 μm | > 30 μm |
| Metal Redistribution Line/Space | 30 μm/30 μm | 10 μm/10 μm |
| Frequency Range | 0.5 to 60 GHz | 0.5 to 100 GHz |
| Assembly Connections | SMT, wire bond, flip-chip | SMT, wire bond, flip-chip |
| Compliance | RoHS, lead-free | RoHS, lead-free |