



**boschman**  
advanced packaging technology

**PACKAGE DEVELOPMENT**



## Boschman is the one stop shop for highly innovative packaging solutions.

Boschman is a high-tech, solution driven Dutch company focusing on advanced packaging solutions. We provide a unique one-stop-shop concept – from idea to industrialization – offering her customers one point of contact for all packaging business. This approach ensures all processes to be carefully monitored and integrated, in order to create the most efficient and effective packaging solution and as short as possible time-to-market.

### Our technologies

- **Ag-Sintering**

Silver sintering is a proven die attach technology offering a void-free and strong bond with high thermal and electrical conductivity. It provides both high yield and high reliability.

- **Film Assisted Molding (FAM)**

Film Assisted Molding is a cluster of unique technologies using films in between the molds and the products to be encapsulated. This technology offers many advantages.

- **Dynamic Insert Technology**

Dynamic Insert Technology (DIT) is a patented technology that has been developed to further optimize the performance of FAM to automatically and dynamically control pressure on one or multiple surface. To keep specific areas fully exposed.

- **Through Polymer Via (TPV)**

Through Polymer Via (TPV) is a patented technology to create high-density high-aspect ratio electrical and/or optical inter-connections through (transfer-molding) package encapsulation.

### Our application area's

- Mems & Sensors
- High Power Modules and packages
- Optical Packages
- 2.5D/3D Packages
- Smart Cards

### Our industry focus

Our satisfied customers can be found in the following industries:

- Automotive
- Medical
- Avionics
- Mobile
- Industrial & Renewables



# ABOUT PACKAGE DEVELOPMENT



## Package conceptualization

In the concept phase critical design points are being investigated by flow analysis, stress and thermal FEM simulations.



## Package design

Details are being defined and an overview of pros and cons in terms of assembly risks and used technology versus costs is made.

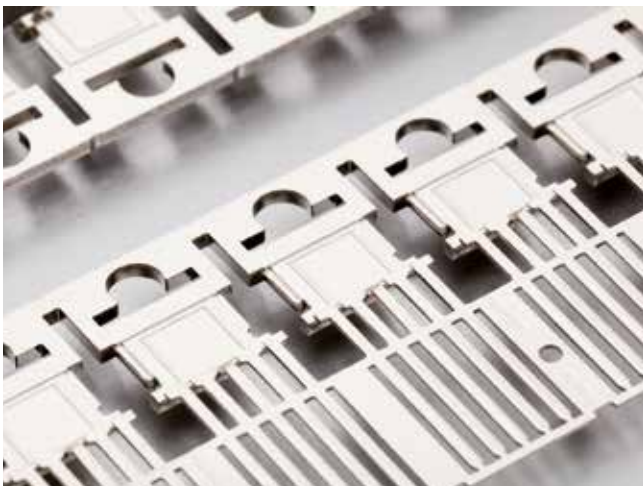


## Prototyping & Sampling

The goal of prototyping is to proof that the concept works and delivers packaged products according to specifications. Prototypes are suitable for reliability testing and customer sampling.

## From conceptualization towards high yield production.

We research, design and prototype advanced packaging concepts. Together with you, we develop and assemble innovative, out of the box package solutions. It all starts with getting to know each other's expectations, capabilities and limitations in order to build your tomorrow's product today!



We offer packaging solutions for high added value products with enhanced functionality. Depending on your application requirements we customize the package design, varying from incrementally improved standard packages (QFN, TO, LGA, SO/SIL/DIL etc) to fully customized packages, to meet your performance and reliability specifications. We manufacture our development prototypes on production compliant equipment which allows you to use these prototypes for functional testing, reliability testing and customer sampling. Boschman implements their proprietary know-how regarding sintering and molding into package designs which is supported by the Boschman equipment proposition. For molding and sintering we also offer separate test and sampling capabilities. Our package development activities are fully ISO-9001-2015 compliant.



# COMPLETE SERVICE



## 1. Package Concept

In the Package Concept phase we define based on the customer requirements the initial specifications and the rough outline of the package design, for instance based on an existing standard (QFN, TO, LGA, etc) or fully customized. Additionally we try in mutual interaction with the customer to identify as early as possible potential risks, either related to materials, processes, or other factors.



## 2. Package Design

In the Package Design phase we identify the full mechanical design of the package, including all related materials, dimensions and tolerances. Depending on the complexity of the design, this phase might include mold-flow simulations, thermal simulations or (thermo-) mechanical simulations. The outcome of such simulations might lead to iterations in the package concept and/or design phase.



## 3. POD Freeze

The Product Outline Design (POD) freeze is an important milestone after which no significant changes in materials, dimensions or tolerances are allowed. The customer needs to sign off on this milestone.



## 4. Tool Design

Once the Product Outline Design is frozen, all related tooling for package assembly can be designed. Such tools can be necessary for molding, sintering, trim & form and other assembly processes, but can also include product carriers and other secondary tools.



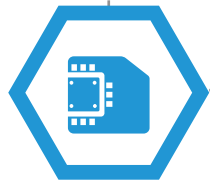
## 5. Tool Manufacturing

Once all tools have been designed the tools can be manufactured. Boschman has an in-house tool-shop which puts us in a unique position and allows us to fully control quality, material choices, product-tool interactions and more for most of all tooling. In this way Boschman can ensure best tool performance and fast changes or iterations.



## 6. Process Development

With the availability of all materials and tooling the initial process setup or process development can start. Optimum process parameters for all related assembly processes need to be determined and if necessary new processes need to be developed including corresponding process windows.



## 7. Small Series Assembly

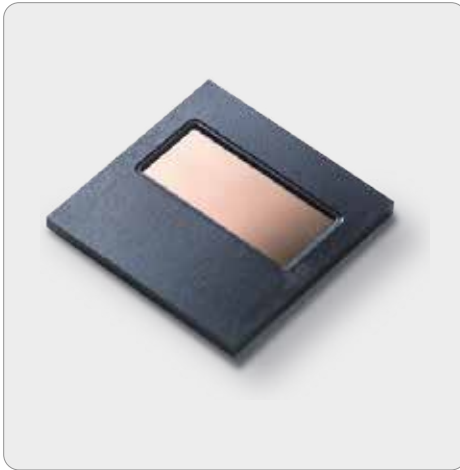
A package development project typically ends with the assembly of a small series prototypes. Since Boschman only uses production-grade equipment these prototypes are of sufficient quality to either start functional and/or reliability testing or initial customer sampling. Upon qualification of such samples a development project may lead to optimization and qualification for mass-production.



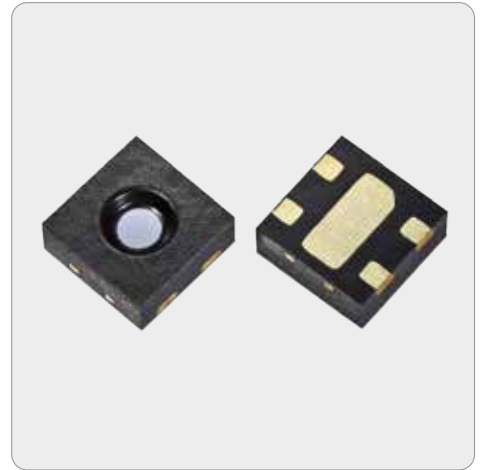
## APPLICATION EXAMPLES



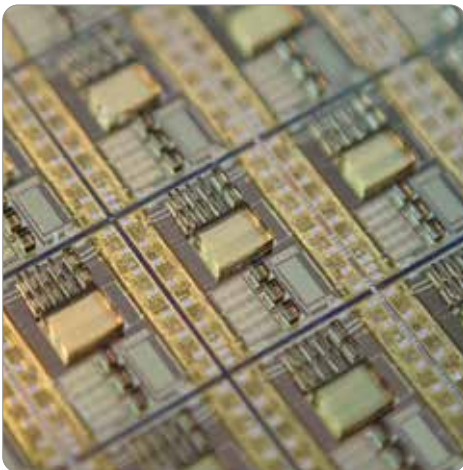
A 120 GHz transceiver package using Through Polymer Via (TPV) technology. TPV enables high density electrical or optical interconnects through your package. Picture above with courtesy of Silicon Radar GmbH and Technical University of Delft.



Sensor package based on over-molded LGA with large exposed window. Picture courtesy of DNA-E Ltd. The device is used as a disposable DNA sensor in a table top system.



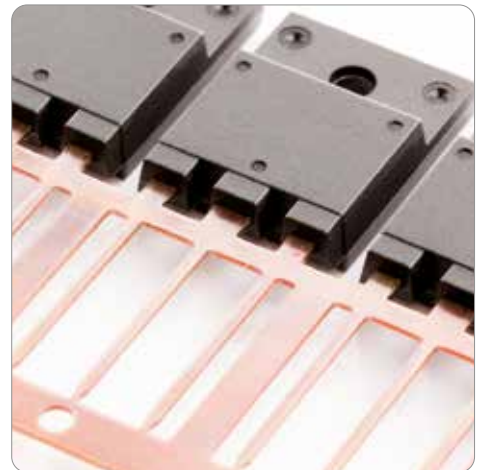
Humidity sensor on lead frame in QFN package. The top side shows an open (exposed) sensor area. The smallest window that can be designed with Film Assisted Molding is approximately  $\varnothing$  0.30 mm.



An optical multi-sensor wafer using Through Polymer Via (TPV) technology to create individual optical windows for each detector. This picture shows the wafer before singulation and assembly. Pictures above with courtesy of IC-Haus GmbH and Technical University of Delft.



An integrated power module. These kind of customized modules, fully Ag-sintered, encapsulated and with double-sided cooling, are used for highly efficient inverters for EVs.



Power package in a TO-3pf/247 layout. This package layout is now also available with single- or double sided Ag-sintering (clip) for optimum thermal performance.

“ SMALLER, BETTER AND LOWER  
COST, WE REALIZE THE BEST  
PACKAGE FOR YOUR PRODUCT ”



package  
development



assembly  
services



equipment

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