Micro-Hybrid Electronic GmbH is a high-technology company for electronic micro systems and infrared components. We develop customer specific innovative solutions and offer distinct product features for sophisticated applications. Micro-Hybrid designs electronic and sensor systems for global markets of industrial automation, medical and environmental technology as well as aviation. Micro-Hybrid is part of the Micro-Epsilon Group.
you are looking for a smart electronics solution? You are interested in individual options to build modules living up to high standards as to stability and reliability?

Readily-available standard technologies do not support the performance of your product? Our products and technologies will improve your system!

Together we will create technically innovative solutions that will result in tangible competitive advantages for you. Our services and products are highly performant and custom designed in every aspect.

ONE-STOP-SHOP
From consulting, development and component design all the way to series production we offer the entire supply chain management. It is entirely up to you to decide at which point of the value added chain you want to enter. It’s your ONE-STOP-SHOP solution for your specific microsystem.

Welcome at living microworlds.

Dear readers,
Micro-Hybrid develops and produces high-quality electronic micro systems and modules for measuring, control and testing applications:

- Medical technology
- Industry and Automation
- Semiconductors
- Power electronics
- Data and communications

As part of our qualification management, all components are subjected to stringent testing (standard/customer-specific) to guarantee the quality and reliability of our electronic micro systems.

**Quality processing by high standards**

- Burn-in testing
- Lifespan testing
- Temperature cycle test
- Temperature humidity test
- High temperature storage (HTS)
- High temperature operating life (HTOL)
- Vibration & acceleration
- Drop testing
- Material testing lab (metallography, structural analysis, strength determination, ...)
- 3D microscopic measurement methods for evaluation of micro mechanical components
- Fine and broad leakage testing to determine hermetic sealing
- Visual inspection according IPC610 by trained staff (ESA quality certification)
- 100% final inspection including test certificate

**Certifications**

- ISO 9001:2008
- IPC 610
- HL3-ECSS-Q-ST-70-08C (High quality manual) soldering and in house training

More information about our testing standards on page 20.
Ceramic PCB exhibit advantageous properties compared to typical materials of microsystem technology. In particular, thermal conductivity, thermal coefficient of expansion and operating temperature allow sophisticated micro systems for harsh environments.

Using excellent characteristics of ceramic circuit boards we empower electronic micro systems to fulfill high-tech requirements.

Electronic micro system performance starts here

Printed circuit board assembly

Board Technologies
- Al2O3 thick film ceramic
- LTCC
- Multi layer for 3D functionality
- Organic PCB (FRx, PTFE, rigid-flex, ...)
- AlN
- Thin film

Sinter furnace
- Sirratherm 1900
- Ekra CPS (Fully automatic screen printing line)
- REHM (specially made for Micro-Hybrid: improved automation by drying magazines)
Thick film circuits

Assembling electronic circuits on thick film substrates we use diverse processes:

- Screen-printing technique for resistors, conductors, contact systems and multi layers
- Active and passive laser trimming
- Screen-printing of overglaze and protective lacquer

Technical details

| Substrate: | Al₂O₃ |
| Standard size: | 4" × 4" |
| Standard substrate thickness: | 0,25 – 1 mm |
| Screen-printing: | typical thickness ca. 5 ... 50 μm |
| Paste systems: | AgPd, AgPt, Au, resistor pastes, dielectrics, overglaze |
| Construction: | Monolayer, Multilayer, typically: 4 layers, duplex print, metallized through-holes / vias / interlayer connection |
| Resistors: | Thick film pastes, trimmable, also PTC for sensor applications |

Thick film circuits are particularly suitable for electronic applications in harsh environments.
LTCC – Low temperature cofired ceramics

In case of applications with especially demanding nature, whether in space or harsh environments on earth, LTCC multilayer circuits master the mission.

Fields of application for LTCC

- High frequency circuits – highest possible system integration
- Medical technology – request for sterilisation
- Harsh environment – for example vacuum, high temperature lacquer
- High degree of integration – realisation in stepped cavities
- Special application for thermal decoupling – infrared detectors and emitter

Advantages

- High integration density
  (3D-ceramic multilayers – down to 50 µm)
- Long lifetime
- High temperature capability
- Temperature change resilience
- Dielectric strength

Processflow LTCC

1. Metallization for framing
2. Via
3. Structured ceramic layers
4. Bump pads
5. Stepped bonding planes
6. Cavity for chip element
7. Control for assembly on heat sink
8. GND-planes
9. Inner layer metallization
10. solderable metallization
11. Resistors
12. solder step / overplane
SMD / THT Assembly

To manufacture high complex circuits we use the latest assembling technologies and invest regularly in machinery and equipment.

**Skills and technologies**

**Machine park PCB**
- SMT Quattropeak M + Nitro
- Soldering Paste Yamaha YSP10
- Soldering Paste Printing DEK Horizon3i
- Mycronic TP9, TP9U
- Mycronic MY-12 1, MY-12-2
- All OptiCon AdvancedLine, BasicLine

**Automated assembly**

**Manual assembly**
Components, unsuitable for automated assembly
- Circuit board size up to: 450 mm x 500 mm
- Chip (from 01005), SOIC, SOT, SOD, TSOP, MELF, CSP, QFP, BGA
- Leadframes for SIL / DIL with pitches 1,27 mm and 2,54 mm

**Cleaning of components/devices**
- Automated process flow
- With or without ultrasonic
- Solvent-based or water-based
Soldering assembly

Process controlled soldering
- Selective soldering
- Vapour-phase soldering
- Vacuum soldering
- Inert gas soldering
- Protective gas soldering
- Hot bar soldering of flex connectors
- Reflow soldering

Manual soldering
- Manual assembly of SMD and THT components
- Soldering of non SMD components, special components or connectors according to IPC 610
- Production according to ESA standard (Aerospace)

Micro assembly

Construction of complex miniaturized systems with various technologies and materials in our own production.

Construction
- Plasma surface treatment
  - Semiconductors, optical and structural elements
- Chip assembly
  - Semiconductor chips, LED, MMIC with adhesives, sintering materials, soldering materials on rigid and flexible substrates:
    - MEMS chips (IR emitter, thermopile, pyroelectric, ...)
    - Optical elements (IR filter, lenses, ...)
    - Gap welding
    - Optional: UV curable adhesives

Wire bonding
- Aluminium wire, gold wire
- Wedge-wedge ultrasonic bonding
- Bonding in cavities
- Fine-pitch, ribbon, high frequency applications
  - Series production of small to medium volumes
  - Serial production of up to 1 million units per year
We offer suitable technologies to protect circuits against environmental and chemically aggressive influences by coating or housing.

**Circuit protection technologies**

- **Hermetic sealing**
  - Metal-glass packages
  - Ceramic-metal, ceramic-ceramic packages
  - Bake out and evacuation for vacuum applications
  - Inert gas backfilling
  - Welding process, soldering process

- **Parylen coating**
  - Typ N, C, F

- **Welding techniques**
  - Laser welding
  - Resistance projection welding

- **Leakage test**
  - Gross leak test
  - Helium fine leak test

- **Vacuum and inert gas soldering**
  - Metal package, ceramic package, IR filter, with and without flux

**Passivation / Glob Top**
Protective lacquering, Glob Top, component casting
We developed LED packaging technologies to achieve optimal performance and perfect integration at once. Due to their efficient performance power LED emitters are used in various industrial fields.

### Advantages of Micro-Hybrid LED modules:

- Particularly high luminance of light sources
- Intelligent heat management by using ceramic substrates
- Long lifetime of LED components
- Integration of optical elements
- Individual adoption of CoB technology

### Applications

- Surface coating
- Curing of lacquer surface and adhesives
- Chemical, medical and biotechnological applications

### Quality management

- SPC of individual processes
- 100% IR thermo optical control of mounted LED

## Standard process LED packaging:

**SMD assembly of LED components on PCB**

- **Cost effective**
- Limited degree of integration and limited max. optical performance

## Micro-Hybrid advanced LED Packaging:

**Chip and wire process on ceramic substrates as subcarrier and for heat storage**

- **Substrate assembly on metallic heat sink**
- **High degree of integration**
- **High attainable optical performance**

**Using carrier substrates and jointing materials**

- Electrical controlability by complying current carrier capacities of conducting track materials
- Maximum integration level by using LED in chip or flip chip forms
- AlN ceramic substrates as subcarrier and heat storage (thermal conductivity...)
- Special qualified jointing materials for LED and substrate assembly
- System reliability by 100 % IR thermo optical control of mounted LED

Optimizing the packaging by considering the thermal path from the LED to the cooling medium, we maximize the attainable optical power.
High-level electronic micro systems

Within our application consulting we closely cooperate with you to find the perfect combination of technological options to realize the ideal electronic micro system. In this way even such projects come true that cannot be realized on the basis of conventional production standards. Even harsh environments won’t stop us.

Whether at the idea-finding, concept or product development phase – you can access the project at any stage of the development process. We synergistically combine our technological competencies in electronic and mechanical design, software engineering, optics, microelectronic packaging as well as simulation and test to perform the optimal customized solution.

For you to reach your goals, we are also able to adapt and further develop our existing technologies and processes as part of our process development.

Joint and cooperative projects with renown universities and institutes regularly provide us with new impulses to extend our portfolio. A powerful team consisting of physicists, technologists, design engineers, hard- and software developers is awaiting your challenge!

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Technology development

- Ceramic board technologies: development of new material systems and combinations for thick film, LTCC, AlN, tape on substrate, SiC, isolated metal support, thick film on metal
- Assembling and soldering technologies
- Chip on board
- Hermetic sealing technologies

Product development

- Mechanical 3D design and construction
- Flow and thermal simulation
- Analog and digital electronic hardware design and simulation
- Microcontroller and PC based software design and simulation
- Measurement systems for optical characterization and calibration
- Durability and reliability verification
- Statistical evaluation of all measurement results
- Customized housing and packaging
- Micro system CAD
- Layout for PCB, thickfilm and LTCC circuits

Test and measurement equipment

- Pyrometers and infrared cameras
- FTIR spectrometer with external input for IR sources
- Calibration black body up to 1200 °C
- Calibration systems for gas measurement
- Measurement equipment for electrical characterization and calibration
- Surface and 3D analysis
- Geometrical measurement / test
- AOI tests, optical measurements
- He leakage test for hermetically sealed components
- Burn-in-test

Laboratory

- Metallographic analyses
- Environmental tests
- Fast temperature change – thermocycling
- High and low temperature storage (+300 °C; -70 °C)
- High humidity storage
- Mechanical vibration and acceleration
- Rapid prototyping of electronic and mechanical development samples
- Development of customized optical and electrical test equipment
- Strength tests (shear, pull, peel, …)
- Microsystems / quality / climatic tests
FACTS & FIGURES

3 manufacturing sites in Germany
Headquarters – Hermsdorf

130 employees
A powerful team is awaiting your challenge!

International sales
Individual micro electronic solutions worldwide

International sales 2015 – Over 15 mill. dollar worldwide

North America 20 %
Europe 70 %
Asia 10 %

FACTS & FIGURES

Business segments (2015)

ELECTRONIC MICRO-SYSTEMS
70 %

INFRARED COMPONENTS AND SYSTEMS
30 %

1992
Micro-Hybrid founded in Hermsdorf / Germany

1998
Starting with IR components: IR thermopile detectors

2002
ISO 9001 quality management certified

2004
Modular for NASA Missions Mars Exploration Rovers „Spirit“ and „Opportunity“

2007
Modern micro-assembly facility

2009
First pyroelectric detectors

2010
First MEMS-IR sensors; Production site Münchenbernsdorf: production for higher volume

2011
First CO2 and CH4 gas sensors available; First in-line SMD assembly

2013
Continuous climate control of all production areas

2015
Official opening of NOVA IR MEMS fab in Tucson, USA

Majority owner of NOVA IR MEMS fab, Tucson USA

5,000 qm production area

5 mill. investment in innovation and growth

Micro-Hybrid is part of Micro-Epsilon Group

www.micro-epsilon.de
All technical data are based on simulations and tests and subject to change without notice.
Enter New Space.
International Sales

Worldwide availability of product portfolio

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