

# KOLEKTOR

[www.kolektor.com](http://www.kolektor.com)



*From development through  
production to after sales service.*

## Kolektor Siegert

**Sensors**  
**Modules**  
**PCB-Assembly**  
**Voltage Dividers**  
**Networks & Hybrids**



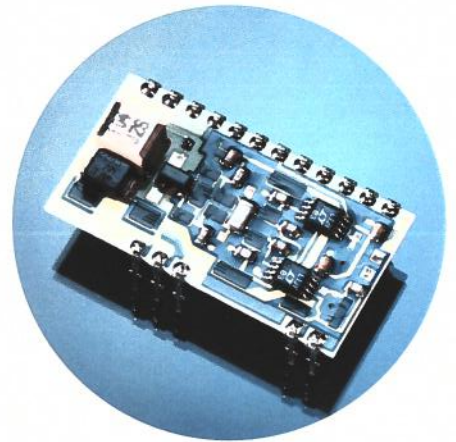
## ABOUT THE COMPANY

Kolektor Siegert is a full service supplier, customer oriented, innovative and flexible. Our service covers the development, production and test, as well as after-sales service. A wide technological basis, modern equipment and State-of-the-art technologies allows us to look for optimised solutions, new ideas and alternative solutions. Centre of our company is a management system, approved and practised according to IATF 16949:2016, ISO 14001:2015, ISO 9001:2015 and ISO 50001:2011. However, the centre of our work is just one - you, our customer.

## THICK FILM HYBRID CIRCUITS

Four decades of thick-film hybrid circuits production distinguish us as one of the largest providers in the German market.

Solder hybrids, vias in ceramic, moulded ceramics, multilayer circuits (up to 6 conductor layers), bond hybrids, flip chips, PTF (Power Thick Film) and multichip modules are our major milestones in this development. We shape our future by participating in research projects in microsystems technology and sensor technology.

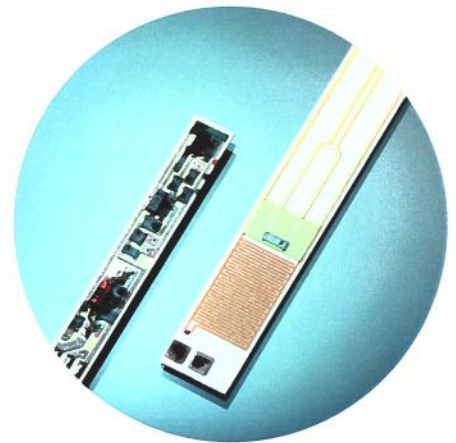


## SENSORS

Development, manufacturing and supply of elementary sensors, subassemblies and complete sensor systems in thick-film and printed circuit board technology for various sensing categories and application areas.

Examples: laser distance detectors, inductive, capacitive and optical proximity switches, medical imaging CCDs, pressure sensors, magneto resistive sensors, temperature, gas sensors, biosensors and many more.

We offer customer specific products and standardized pressure sensors.



## MODULES

1. We accompany your starting.
2. From your circuit design to the finished module with housing.
3. Taking your concerns and wishes seriously into consideration.



Focused on automotive  
Design and construction service  
First reference for hybrids in Europe  
Automatic production of modules  
Customer specific voltage dividers



## VOLTAGE DIVIDERS

Kolektor Siegert's high voltage dividers are customer specified resistor networks made by using thick film technology. They are manufactured using modern printing- and firing processes. Together with the applied laser trimming, we achieve high precision and long-term stability.

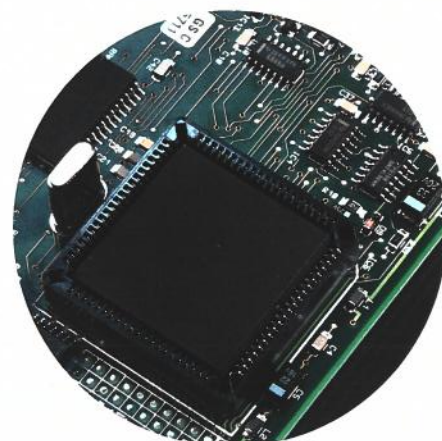
Typical application fields are high voltage technology, medical industry, E-mobility and power train.



## PCB-ASSEMBLY

We are an electronic manufacturing service provider since 40 years. We assemble SMT components down to the smallest sizes, realize fine pitch assemblies, BGA, and flip chips.

Our manufacturing facilities are flexible, in order to fulfill our customer needs completely. These include fully automatic chip shooter lines with integrated flexible assembly modules, as well as semi-automated placement lines and manual placement stations.



# Kolektor Supports You Globally



Pforzheim (DE)

Cadolzburg (DE)

Stuttgart (DE)

Jönköping (SE)

Posojena (SI)

Ljubljana (SI)

Nanjing (CN)

Gumi (KR)

Stockholm (SE)

Moscow (RU)

Chambéry (FR)  
Massy (FR)

Greenville (US)

Vilnius (LT)

Guanajuato (MX)



Laktasija (LT)



New Delhi (IN)

Novi Sad (RS)



- Headquarter
- Production facility
- Development center
- Representative

## Kolektor Siegart GmbH

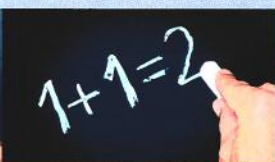
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**We live our values and  
we foster them through our work**

31.01.2019



Responsibility



Fairness



Passion for Success



Customer Proximity



Inventiveness



Team Spirit

# KOLEKTOR



## Technical Information about Thick-Film Technology <sup>(1)</sup>

Substrates

### Material

Standard sizes

Standard thickness

Special thickness

Thermal conductivity <sup>(2)</sup>

Coefficient of linear expansion <sup>(3)</sup>

Dielectric strength

Permittivity

### Aluminiumoxid (Al<sub>2</sub>O<sub>3</sub>; 96%)

4" x 4"; 6" x 4"

0,63 mm; 1 mm

0,16 mm; 0,25 mm; 0,38 mm

20 W/m<sup>2</sup>K

6,4 X 10<sup>-6</sup> /°K

> 15 KV/mm

9, 5

Substrates

### Material

Standard sizes

Standard thickness

Special thickness

Thermal conductivity <sup>(2)</sup>

Coefficient of linear expansion <sup>(3)</sup>

Dielectric strength

Permittivity

### Aluminiumnitrid (AlN)

4" x 4"

0, 63 mm; 1 mm

0,16 mm; 0,25 mm; 0,38 mm

180 W/m<sup>2</sup>K

4,7 X 10<sup>-6</sup> /°K

> 15 KV/mm

9

### Metrics of printed boards

Conductor width

Conductor distances

Layer thickness (burned)

Minimal resistor geometry

≥ 100 µm

≥ 100 µm

5 ... 100 µm, depends on the specification

0,4 x 0,4 mm

### Control

AOI (Automatic optical inspection)

Electrical continuity and short circuit test

High-voltage test (Multilayer)

### Properties of printed conductors and metallizations

Silver (Ag)	2 ... 3 mΩ/□
Silver palladium (AgPd)	10 ... 50 mΩ/□
Silver platinum (AgPt)	2 ... 5 mΩ/□
Gold (Au)	2 ... 5 mΩ/□
Palladium Gold (PdAu)	80 ... 100 mΩ/□
Platinum Gold (PtAu)	70 ... 150 mΩ/□

### Properties of insulating layers (dielectrics)

Layer thickness (fired)	20 ... 40 μm, others by agreement
Insulation resistance	≥ 10 <sup>11</sup> Ω
Dielectric strength	≥ 300 V <sup>(4)</sup> at a layer thickness of 35 μm
Dielectric constant (1 MHz)	8 ... 10

### Properties of printed resistors

Realizable nominal resistance	< 10 mΩ... > 100 MΩ
Resistance tolerance	1 % in the value range (100 Ω... 1 MΩ)
Resistance tolerance (special)	≥ 0,1 %, on request and by agreement
Maximum power dissipation	0,5 ... 1 W/mm <sup>2</sup> (1 KΩ ... 1 MΩ)
Temperature coefficient, absolute	50 ... 100 ppm, depending on the paste system
Temperature coefficient, relative	< 20 ppm referred to the same resistance printing sequence
Long-term stability	typically 0,3 %, smaller values by agreement

### Properties of plated-through-holes

Diameter	0,2 ... 0,4 mm (at 0,63 mm Substrate thickness)
Contact resistance	< 30 mΩ

### Passivation

Unpopulated circuits	Glass passivation Additive or alternatively silicone
Assembled circuits	Hermetically sealed in metal or ceramic housing Potting in housing Spray or dip coating

### Hybrid designs

Single in line (SIL), pitch 2,54 / 1,27mm<sup>(5)</sup>  
Dual in line (DIL), pitch 2,54 / 1,27mm<sup>(5)</sup>  
Pads with or without tinning  
Special designs on request e.g. in metal cases etc

### Assembly

#### Soldering

Reflow, N<sub>2</sub> atmosphere and vacuum  
Wave, N<sub>2</sub> atmosphere on request  
Selective soldering of THT components  
Hand soldering of special designs  
Robotic soldering of special designs  
Dip soldering of connection pins

#### Control

AOI (automatic optical inspection)  
Electrical function test  
Incircuittest  
Dynamic load tests (T-change, climate etc.)

#### Assembly of SMT components

Fully automatic SMT lines

#### Assembly of unboxed Semiconductors

Die bonding (gluing, soldering)  
Wire bonding (Au, Al)  
Flip Chip  
Glob Top (Epoxy, Silicone)

(<sup>1</sup>) This is for technical information only and does not constitute a contractually guaranteed characteristics.

(<sup>2</sup>) At a temperature range of 20 ... 100 °C

(<sup>3</sup>) At a temperature range of 20 ... 300 °C

(<sup>4</sup>) Higher values on request

(<sup>5</sup>) Other connection grid on request