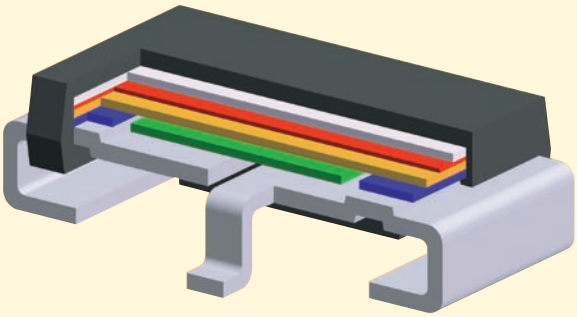
Innovative components for power electronics

ISA-PLAN® -SMD
Precision and power resistors

The mΩ-concept

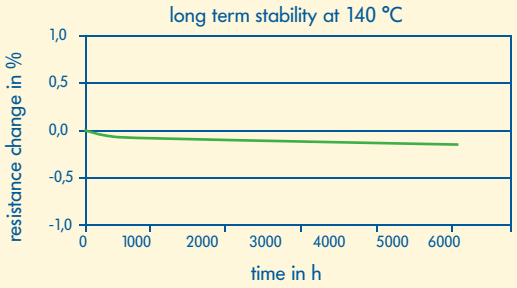
Precision current measurement in the ampere range with SMD resistors? For many manufacturers and users a problem that was difficult to solve in the past. If the requirements for large pulse currents coincided with high ambient temperatures, this obviously resulted in a contradiction that could only be solved inadequately or not at all using the existing resistance technologies.

Not so with the ISA-PLAN® technology developed by ISABELLENHÜTTE. Here the resistance components are manufactured from etched, bulk MANGANIN® foils and, electrically insulated, mounted on a substrate with good thermal conductivity. Today, five established SMD product families are available on the market, which cover nearly all requirements of our customers.



Construction of the SMV resistor

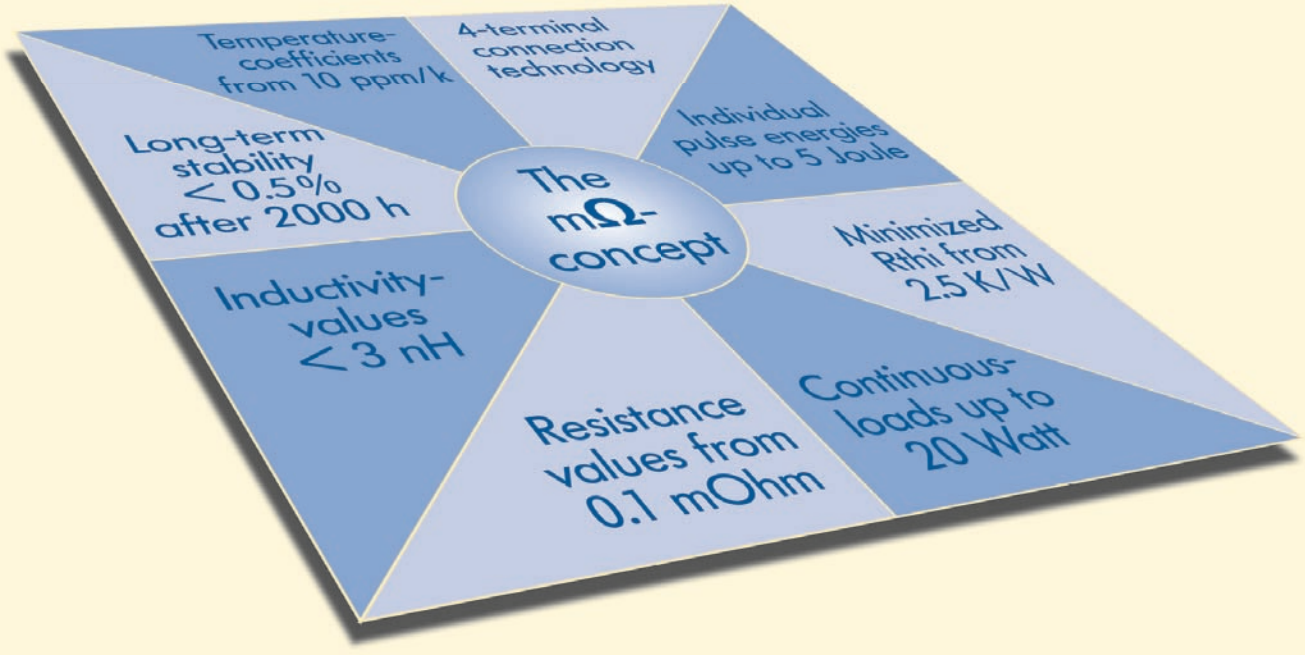
The essential base is the application of the precision resistance alloy MANGANIN® with its very low temperature coefficient of 10 ppm/K and the extremely good long-term stability. In addition, the resistance alloy has thermo-electrically been matched to copper so that the thermal EMF is reduced almost to zero. Despite the relatively high load capacity, the intrinsic temperature rise of the resistance foil is very low due to the high thermal conductivity of the composite material with the consequence that the resistance drift even at rated load and simultaneously high ambient temperatures is only a few tenth of a percent after several 1,000 hours.



Typical long-term behaviour at 140 °C

Optimized current density distribution in the component avoids the danger of hot spots. The relatively high mass of the resistance material and the high thermal capacity of the metal substrate ensure sound pulse capacity.

The ISA-PLAN® foil technology is ideally suited for the manufacture of SMD resistors in the value range from 0.1 mOhm to 20 Ohm. The planar construction permits the ideal realization of the 4-terminal connection technology. This is a prerequisite for the manufacture of temperature coefficients of 10 ppm/K and below with great reproducibility even with values <10 mOhm. With the low-inductivity structures, the components are ideally suited for use in switch-mode driven power electronics.



ISA-PLAN®-SMD preci

Conventional SMD assembly

Technical data

Value ranges	5 mΩ - 2 Ω
Tolerance	0.5, 1, 5 %
TC	< 50 ppm/K
Power	up to 3 Watt
Contin. current	up to 25 A
Pulse energy	up to 0.2 J
Rthi	from 13 K/W

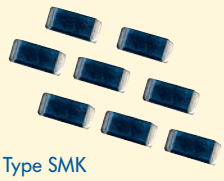
Versions SMK / SMP / SMS / SMT

Description

- Precision and power resistor
- Flat, compact design

Special features

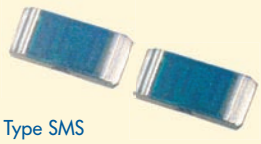
- 4-terminal connection technology on the substrate
- Can be reflow- and wave-soldered
- Low internal thermal resistance



Type SMK
Design1206

Type SMP
Design 2010

Type SMT
Design 2817



Type SMS
Design 2512

Technical data

Value ranges	1 mΩ - 4.7 Ω
Tolerance	0.5, 1, 5 %
TC	< 30 ppm/K
Power	up to 3 Watt
Contin. current	up to 50 A
Pulse energy	up to 0.5 J
Rthi	from 15 K/W

Versions SMR / SMV

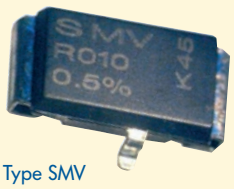
Description

- Precision and power resistor
- In Duroplast package

Special features

- 4-terminal connection technology on the substrate
- Solid Cu contact suitable for high current load
- Can be reflow- and wave-soldered

Type SMR
Design 4723



Type SMV
Design 4723

Flip chip assembly

Technical data

Value ranges	1 - 100 mΩ
Tolerance	1*, 5 %
TC	< 50 ppm/K
Power	up to 2 Watt
Contin. current	up to 44 A (1mOhm)
Pulse energy	up to 0.1 J
Rthi	from 25 K/W

* under development

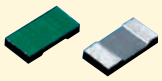
Versions LMK / LMP / LMS

Description

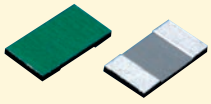
- Low ohmic precision and power resistor
- extremely low inductance

Special features

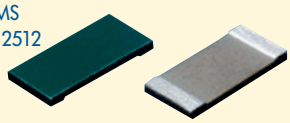
- standard pad size
- reduced internal heat resistance
- high pulse power



Type LMK
Design 1206



Type LMP
Design 2010

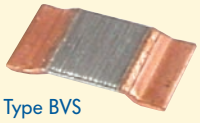


Type LMS
Design 2512

ision and power resistors

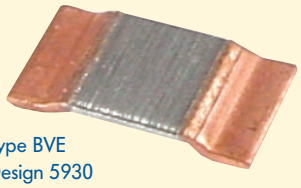
Versions BVR / BVS / BVE

SMD-resistors of composite materials



Type BVS
Design 3920

Type BVR
Design 3925



Type BVE
Design 5930

Technical data

Value ranges	0.1 - 4 mΩ
Tolerance	1, 5 %
TC	< 50 ppm/K
Power	up to 5 Watt
Contin. current	up to 160 A
Pulse energy	up to 5 J
Rthi	from 4 K/W

Description

- SMD-precision and power resistor
- Made from electron beam welded composite materials (Copper-MANGANIN®-Copper)

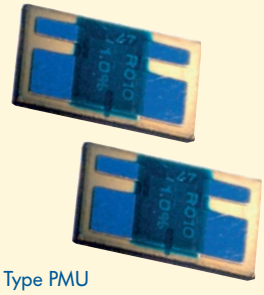
Special features

- Lowest resistance values
- Welding assembly on Cu punched grid
- Ideal for the assembly on DCB / IMS
- 4-terminal connection for BVR

Versions SMH / PMB / PMU

Type SMH
Design 2512

Type PMB
Design 3939



Type PMU
Design 3925

Technical data

Value ranges	1mΩ - 20 Ω
Tolerance	0.5, 1, 5 %
TC	< 30 ppm/K
Power	up to 20 Watt
Contin. current	130 A
Pulse energy	up to 1 J
Rthi	from 2.5 K/W

Description

- Precision and power resistor
- Bondable voltage and current terminal areas

Special features

- 4-terminal connection technology
- Direct DCB / IMS solder assembly
- Very high load capacity

Hybrid-assembly

The components are shown at a scale of 2.5 : 1.

ISA-PLAN® SMD
Precision and power resistors

The mΩ-concept

Technology

ISA-PLAN® foil resistors!

- Vacuum lamination technology
- Reproducible precision etching structures
- Ni diffusion barrier layers
- Dip coating of terminals with SnPb
- Bondable contact surfaces

Quality

Reliability through 100 % inspection!

- Manufacture according to TS 16949
- Clear traceability through continuous documentation
- Full labeling including date code

Solderability

Processability in all known soldering processes!

- Hot air, reflow, IR and wave soldering process
- Hybrid resistors can be processed at 250 °C (10 min)
- Bond pads treated according to specification

Specification

Application-oriented support!

- Internal qualification of components according to MIL 202
- Simulation of your operating conditions
- Component optimization for critical applications especially in automotive market
- SMD test boards for pilot tests
- Comprehensive documentation

Value range

Standard values available ex stock at short notice!

- E6/ E12/ decade values depending on version
- Intermediate values on request
- 24 hour component dispatch

Packaging

Delivery in standard SMD packages!

- Long shelf life / sound processability through dip coated surfaces
- Packaged under inert gas in carrier tape
- Types according to IEC 286-3 (EIA-481)
- Hybrid SMD available as an alternative in chip tray

Support

User information on the SMD-hotline!

- Dr. Ullrich Hetzler - 240 Manager R & D
- Thomas Otto - 282 Technical Sales

Innovative components for power electronics

ISABELLENHÜTTE
ISABELLENHÜTTE Heusler GmbH KG
Eibacher Weg 3-5 · 35683 Dillenburg
P.O. Box 1453 · D-35664 Dillenburg
Phone +49 2771/ 934-0 · Facsimile +49 2771/ 23030
www.isabellenhuette.de · www.isa-asic.de
vk.bauelemente@isabellenhuette.de