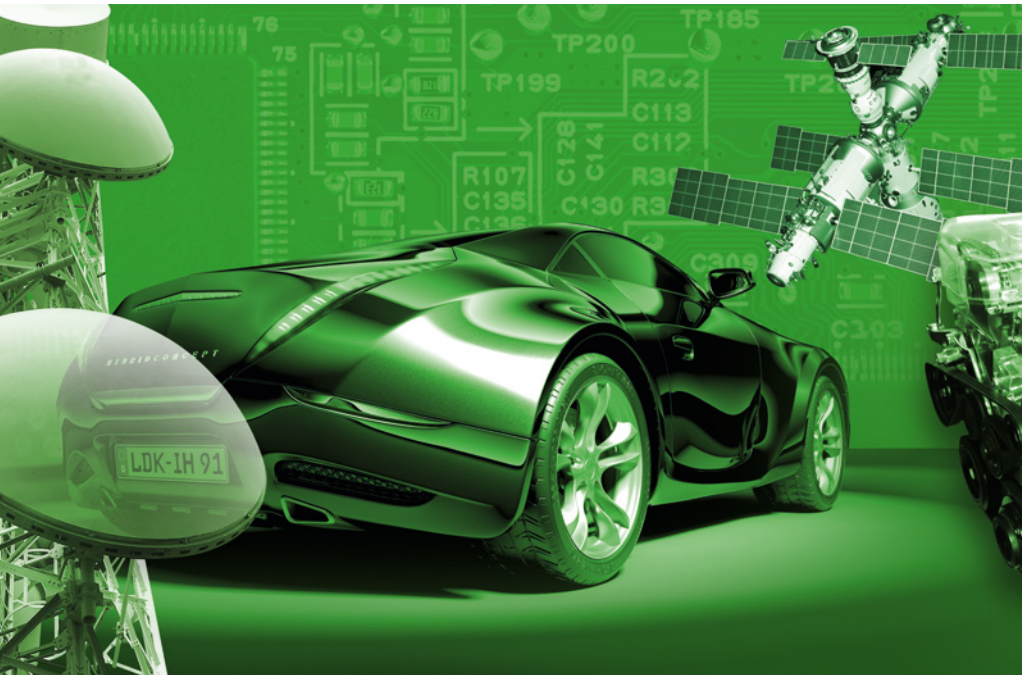


BUILT FOR AEROSPACE TECHNOLOGY



RESISTORS FOR AEROSPACE APPLICATIONS



ISABELLENHÜTTE

Innovation by Tradition

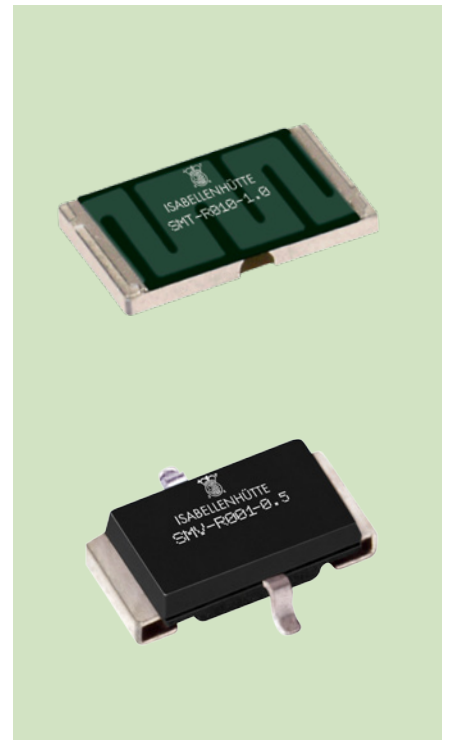
# ISABELLENHÜTTE IS ALWAYS ON BOARD

In almost all renowned European aerospace projects, the quality of Isabellenhütte is trusted in:

- \_ **Galileo:** Since December 28, 2005, the navigation systems of the GIO VE-A satellites have been equipped with measuring resistors from Isabellenhütte. Until today, almost 30 satellites have been used successfully in outer space.
- \_ **Solar Panel:** The battery management systems of various satellites have been equipped with Isabellenhütte resistors.
- \_ **Jules Verne:** The precision and reliability of Isabellenhütte's products have also been trusted in for the equipment of the ATV (Automated Transfer Vehicle), the European equivalent of the Space Shuttle.
- \_ **Board Electronics:** Voltage regulator in satellites.
- \_ **Power Supplies:** Used in DC/DC converters for the decentralized energy distribution in satellites and helicopters.



*Galileo Mission*



*Aviation*



*Solar Panel*



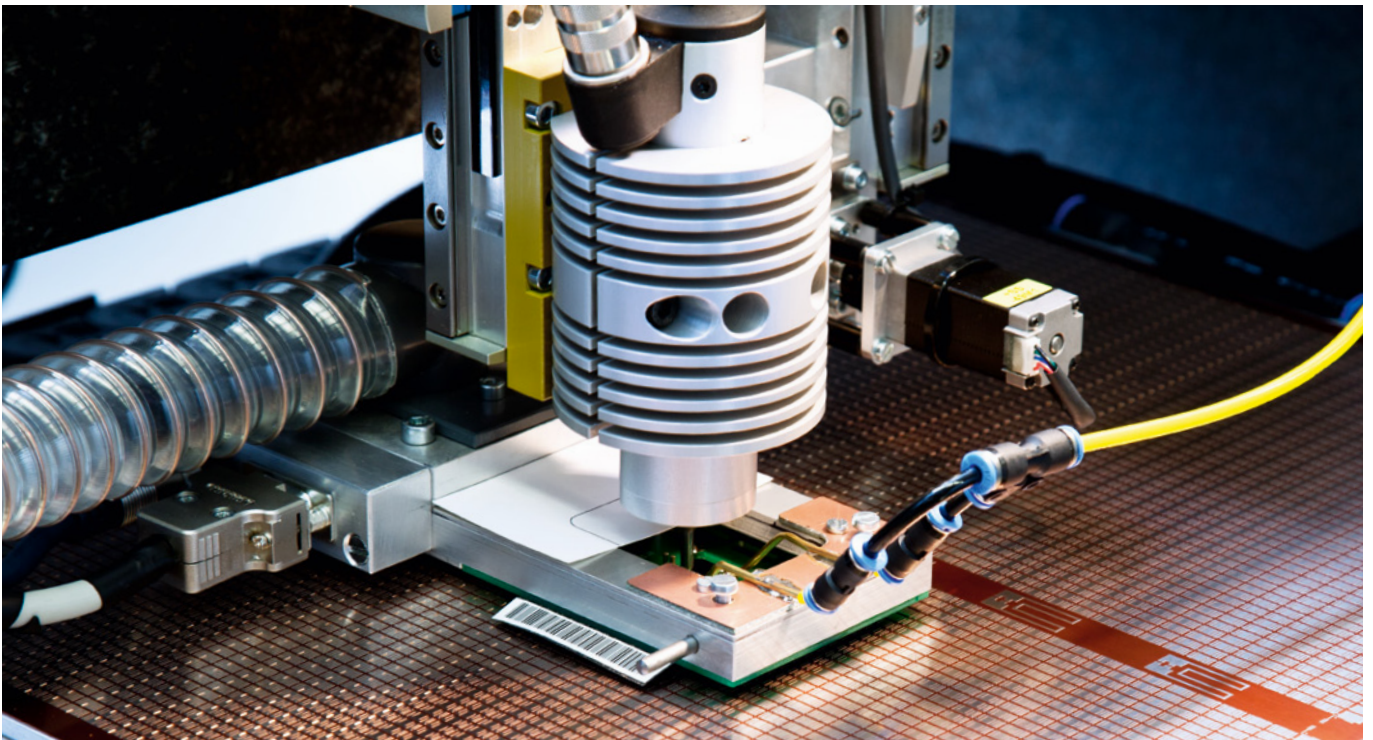
*Jules Verne Mission*





## WORKING FOR THE AEROSPACE INDUSTRY FOR MORE THAN TEN YEARS

Whenever highest reliability, precision and longevity are required, there is no way around the low-ohmic precision and power resistors from Isabellenhütte. It is not without reason that we have been supplying measuring resistors to the aerospace industry for more than ten years. We always meet the toughest quality standards and consider our customers' individual requirements (ESCC 4001). In addition, the SnPb-tinned contacts avoid the forming of whisker and thus short circuits in many applications.

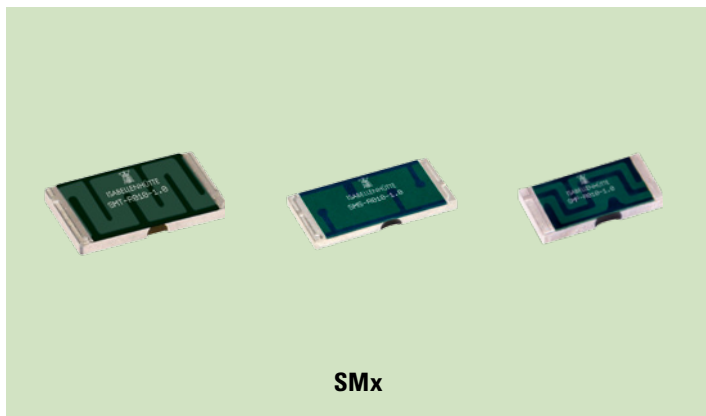


### **Isabellenhütte Heusler GmbH & Co. KG**

Our company is one of the world's leading manufacturers of electrical resistance and thermoelectric alloys for temperature measurement and a well known manufacturer of passive components for the automotive, electrical and electronics industries. Precision measurement systems from Isabellenhütte set the industry benchmark for current, voltage and temperature measurement in cars and trucks, hybrid and electric vehicles, as well as in industrial and renewable energy generating systems.

As a globally renowned specialist and technology leader, our innovative products consistently redefine the state of the art while showcasing Isabellenhütte's technical and innovative capability. Our success is driven by the continuous development of innovative products, new technologies and sophisticated manufacturing processes. In addition, we concentrate a wide range of production steps and proprietary technologies in-house. Our expertise extends from alloy production and forming through etching and assembly to complex automated testing and packaging.

**Innovation by Tradition**



### Precision and power resistors

Modern precision resistors for current measurement have to meet many requirements, such as a small temperature coefficient, a low thermal EMF, high long-term stability, low inductance and a high load capacity. Due to the fact that these properties are influenced by the resistance material as well as by type, we differentiate between two manufacturing technologies: ISA-PLAN® and ISA-WELD®. Whether standard modules or heavily loadable power resistors – our products meet the highest requirements.

### ISA-PLAN® and ISA-WELD® technology

Both technologies are ideally suitable for the manufacturing of precision resistors in the value range of 2.2 mOhm to 2 Ohm. The planar structure permits a simple realization of the 4-terminal connection technology, enabling the generation of temperature coefficients of 10 ppm/K, even with values below 10 mOhm, with a large reproducibility. Due to its low-inductance structures, these components are ideally suitable for the use in clocked power electronics.

### ISA-PLAN®

ISA-PLAN® resistors are manufactured of MANGANIN® and ZERANIN® material, using etching technology. The material is electrically insulated and mounted on a metal substrate with good thermal conductivity. The shunts are predestined for precision applications due to their extremely low thermal EMF and their very high long-term stability. As a result, the heat conduction into the substrate, together with its high thermal capacity, provides excellent pulse and continuous power rating.

### ISA-WELD®

ISA-WELD® resistors are stamped from solid electron-beam welded composite material consisting of copper in combination with one of our resistance alloys, e. g. MANGANIN® or ZERANIN®. The resistors can be adapted by means of stamping and bending to suit almost any shape and application. Further benefits are given by the comparably low input resistance of the copper terminals, their high thermal conductivity respectively their heat storage capacity and the resulting current density and heat dissipation within the shunt. ISA-WELD® shunts are particularly suitable for extremely low-ohmic values (in the range of 0.5 to 5 mOhm). They are available as SMD or busbar assembly.

### Quality standards

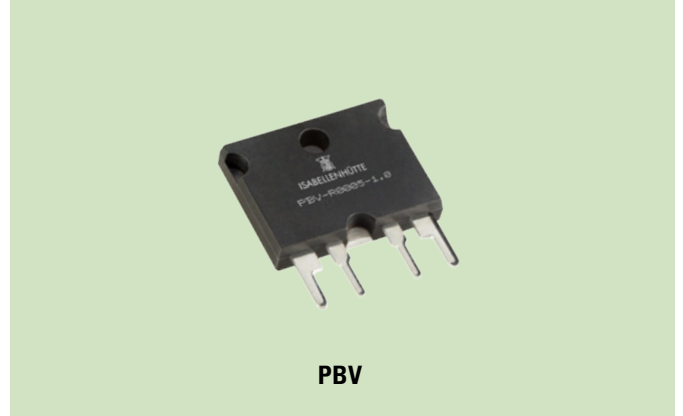
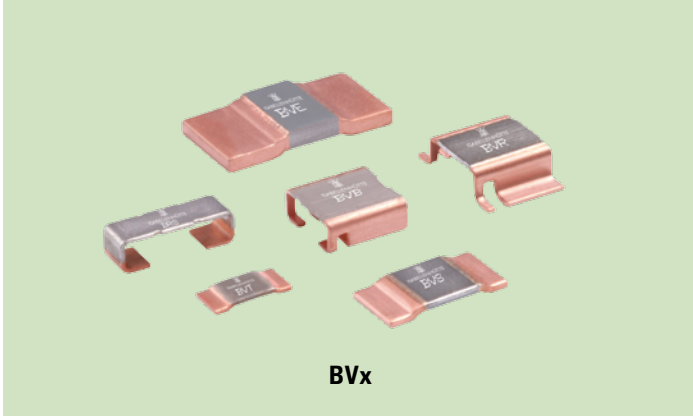
[DIN EN ISO 9001:2008](#)

[DIN EN ISO TS 16949:2009](#)

[DIN EN ISO 14001 / DIN EN ISO 50001](#)

[European Space Agency \(ESA\)](#)





**Qualifications**

- \_ ESCC 4001/027 for aerospace applications
- \_ ESCC 4001/028 for aerospace applications
- \_ Customer-specific qualification

**Quality**

- \_ SnPb tinning of the contacts
- \_ Certificate according to TS 16949 / ISO 9001
- \_ 100 % control
- \_ Clearly retraceable due to gapless documentation
- \_ Date code labeling

**Solderability**

- \_ Processable in all common soldering processes (reflow, IR soldering)
- \_ ISA-WELD® processable up to +350 °C (1 min.)
- \_ ISA-PLAN® processable up to +260 °C (peak)

**Value range**

- \_ E6/E12/decadic values, depending on the type
- \_ Further values on demand

**Service**

- \_ Application-oriented support
- \_ Internal qualification of the components according to ESC 4001 and customer-specific qualification
- \_ Simulation of your conditions of use
- \_ Component optimization for critical applications
- \_ SMD test board for first trials
- \_ Comprehensive documentations
- \_ Standard values can be supplied with SnPb-tinned contacts

**Logistics**

- \_ Long storage life, good processability due to the tinning of the contact areas, packaging in a protective gas atmosphere on straps (straps according to IEC 286-3, DIN EN 60286-3), tarnish protection of ISA-WELD® resistors.

LOW-OHMIC PRECISION AND POWER RESISTORS FOR AEROSPACE APPLICATIONS

SMP	SMS	SMT	SMV
SMP-1R00-0.5-PW	SMS-1R00-0.5-PW	SMT-1R00-0.5-PW	SMV-1R00-0.5-PW
SMP-1R00-1.0-PW	SMS-1R00-1.0-PW	SMT-1R00-1.0-PW	SMV-1R00-1.0-PW
SMP-R010-0.5-PW	SMS-R005-1.0-PW	SMT-2R00-0.5-PW	SMV-R0033-1.0-PW
SMP-R010-1.0-PW	SMS-R008-0.5-PW	SMT-2R00-1.0-PW	SMV-R005-1.0-PW
SMP-R018-1.0-PW	SMS-R010-0.5-PW	SMT-R004-1.0-PW	SMV-R0068-1.0-PW
SMP-R020-1.0-PW	SMS-R010-1.0-PW	SMT-R005-0.5-PW	SMV-R010-0.5-PW
SMP-R027-0.5-PW	SMS-R015-0.5-PW	SMT-R008-0.5-PW	SMV-R010-1.0-PW
SMP-R027-1.0-PW	SMS-R015-1.0-PW	SMT-R010-0.5-PW	SMV-R015-0.5-PW
SMP-R033-1.0-PW	SMS-R020-1.0-PW	SMT-R010-1.0-PW	SMV-R015-1.0-PW
SMP-R047-0.5-PW	SMS-R022-1.0-PW	SMT-R015-0.5-PW	SMV-R018-0.5-PW
SMP-R047-1.0-PW	SMS-R027-0.5-PW	SMT-R015-1.0-PW	SMV-R020-0.5-PW
SMP-R050-0.5-PW	SMS-R027-1.0-PW	SMT-R018-0.5-PW	SMV-R020-1.0-PW
SMP-R050-1.0-PW	SMS-R033-0.5-PW	SMT-R020-0.5-PW	SMV-R022-0.5-PW
SMP-R056-0.5-PW	SMS-R033-1.0-PW	SMT-R020-1.0-PW	SMV-R022-1.0-PW
SMP-R056-1.0-PW	SMS-R047-1.0-PW	SMT-R022-0.5-PW	

You can find further resistance values under:  
<http://www.isabellenhuetten.de/en/precision-and-power-resistors/products/overview/>



CONTACT

.....  
sales.components@isabellenhuette.de  
.....

PROVIDED BY



**ISABELLENHÜTTE**

Innovation by Tradition

Isabellenhütte Heusler GmbH & Co. KG  
Eibacher Weg 3–5 · 35683 Dillenburg · Germany  
P.O. Box 1453 · 35664 Dillenburg · Germany  
Tel +49 (0)2771 934-0 · Fax +49 (0)2771 23030  
info@isabellenhuette.de · www.isabellenhuette.de