

Specialist article "Isabellenhütte ESCC components and qualification services"

Isabellenhütte ESCC components and qualification services

### **Resistors for space**

*For more than ten years, Isabellenhütte has been providing low-ohmic precision resistors for modern space applications, qualified according to the high ESA specifications ESCC4001. Recently, the demand for less qualified components, such as those used in the automotive sector, has been increasing, not least for cost reasons. Isabellenhütte provides its (new-space) customers with detailed qualification data for this purpose on the one hand and enables customer-specific re-qualification of the resistors on the other. Starting in September 2020, Isabellenhütte will start up its own production lines for the so-called EEE components (electrical, electronic and electromechanical components for the space sector).*

ESCC-qualified components from Isabellenhütte include resistors from the SMx series, i.e. SMP, SMS and SMT as the classic representatives of chip resistors, as well as SMV resistors. Possible applications include DC/DC converters or battery management systems in satellites or central control systems in launchers. The tasks of the resistors do not differ significantly from those on earth - for example in the automotive sector - the challenging thing is the environmental conditions, such as the increased radiation in space. However, this affects active components or semiconductor elements more, which can be more severely affected than passive components.

### **Precision and long-term stability**

What makes Isabellenhütte's resistors for space applications stand out is the precision, reliability and load capacity of the components and their high long-term stability. After all, components cannot be easily replaced in space. If launch vehicles generate strong vibrations during launch, the resistors withstand this very well thanks to their large solder pads and lead-tinned terminals. This also has a positive effect on possible whisker growth, which is avoided by the lead-tin coating.

### **Suitability of automotive components**

In addition to the resistors mentioned, which are qualified according to ESA specifications and thus listed in the ESA Qualified Parts List (QPL), other resistors from Isabellenhütte that meet the specifications of the automotive sector may also be suitable. For manufacturers in space projects, this is where the trade-off between cost reduction through lower-qualified components and the increase in the risk of failure when using these components begins. A higher quality component is advantageous for more demanding applications that require long-term availability, such as telecommunications, navigation systems or weather satellites. For shorter-term missions, where satellites are only used for a few months in space, or for launchers that have only a single mission, these components often do not pay off and users look for cheaper alternatives.

### **Customer-specific post-qualifications**

Daniel Theis, industry manager for Aerospace in Isabellenhütte's Components Sales department, has identified a clear need for information on the part of aerospace engineers, which Isabellenhütte would like to meet: "Since last year, we have had an increasing number of requests for qualification data for our components - what can the components do? How precisely do they behave in applications according to the ESCC specifications? We are happy to offer these data and qualifications as a service, i.e. we can pass on extensive data on qualifications that have already been carried out and also carry out customer-specific post-qualifications of components, e.g. according to ESA or NASA specifications or customer-specific requirements."

### **Independent production line for EEE components**

To be able to react even faster and more individually to (new) space requests, in the future Isabellenhütte will separate its EEE component production from the production of automotive components. Starting in September 2020, the company's own production lines are to be available exclusively for EEE components, so that time bottlenecks in delivery can be avoided and the components can be manufactured and delivered according to order.

### **ISA-WELD® resistor BVR for the QPL**

Isabellenhütte is currently working on qualifying an ISA-WELD® resistor (BVR) according to ESCC specifications and thus establishing it in the QPL (Qualified Parts List). It could be used as an extension of the resistance values in the lower range (for 0.2 to two milliohms), for which there is currently no qualified component available. In addition, Isabellenhütte considers the post-

qualification of cheaper automotive components for possible new-space projects to be a complementary addition to the sale of the listed components.

***Interview box Daniel Theis:***



Daniel Theis, industry manager for Aerospace in the Sales department at Isabellenhütte

**What motivates space engineers to switch to less qualified components instead of the ESCC-qualified components?**

We detect different currents in the aerospace industry: On the one hand, there are the fixed requirements and specifications of the space agencies, which many manufacturers follow to achieve a safe product. On the other hand, the commercialization of space mission is increasing the demand for cheaper components that are equally functional due to the large number of new space projects.

**What hurdles do you see in this?**

On the one hand, there is great uncertainty in the industry as to whether components outside the QLP can meet the requirements and are safe enough for use in space. Many engineers do not want to get involved in experiments here and therefore prefer certified EEE components. However, the actual requirements placed on the components during the mission in question are often disregarded - which can turn out to be much lower, for example, if the mission is only a short stay in space. If engineers then want to use automotive components, they are often lacking meaningful information about the performance of the components.

**What recommendations can you give as an expert for precision resistors?**

Space engineers would do well to think "out of the box" and question the requirements for the necessary components due to the nature of the mission.

After all, if these are smaller than in the case of long-term and demanding projects, such as navigation and weather satellites, it is worthwhile to open one's eyes to less qualified parts, e.g. from the automotive sector. Isabellenhütte is happy to assist in providing and checking qualification data, but also in carrying out post-qualifications according to e.g. ESA specifications. This reduces the risk of using automotive components while saving costs at the same time.

### Image material:

Image 1)



Image 2)

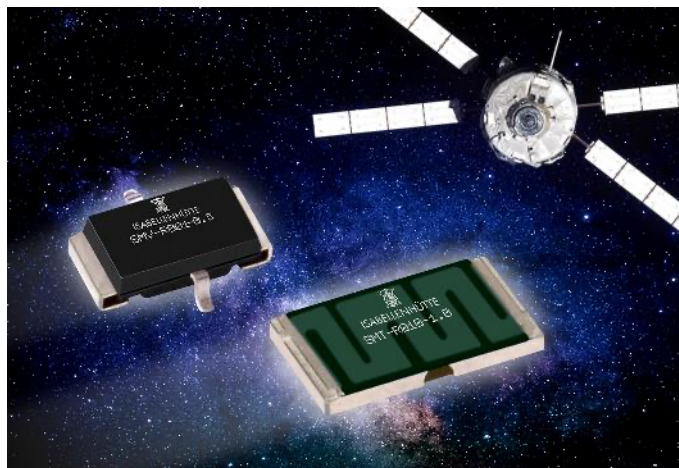


Image caption: Precision resistors from Isabellenhütte have been used for over ten years in a wide variety of applications in space, whether in solar modules (Fig. 1) or the space shuttle Jules Verne in 2008 on its way to supply the international space station (Fig. 2).

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