

The National Technology Development and Qualification Program on EEE Components for Space Applications – Activities on Passive Components

SPACE PASSIVE COMPONENT DAYS
1st International Symposium
Noordwijk, September 24 - 26, 2013

G. Joormann

Knowledge for Tomorrow

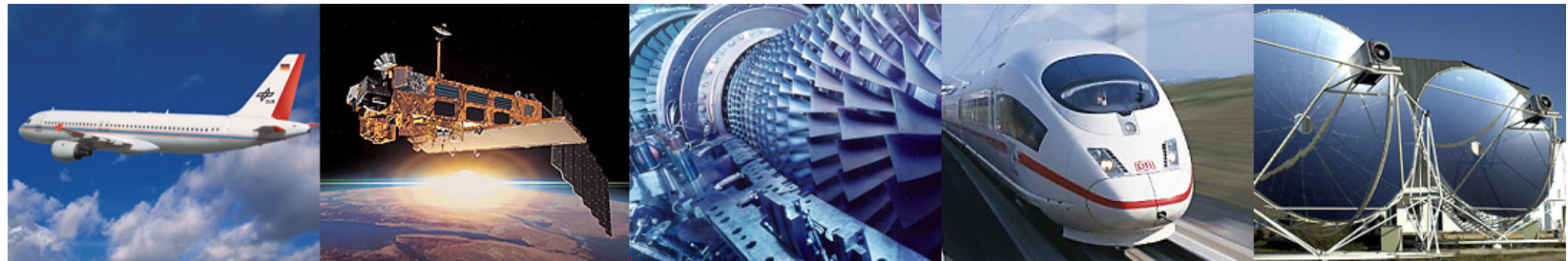


Scope: Activities of Present Manufacturers

- DLR / EEE Parts Section
- KVG Quartz Crystal Technology: crystals and oscillators
- Vishay Electronic – Division Draloric: resistors Type MS1
- Isabellenhütte Heusler GmbH & Co KG: resistors type SMP, SMR, SMS, SMT and SMV
- Leoni Special Cables GmbH: cables with polyimide insulations
- Rosenberger: RF connectors
- Gore: cables
- Tesat Spacecom: COAX circulators / isolators
- Axon: wires, cables, and connectors



DLR German Aerospace Center



Aeronautics

Space

Transportation

Energy

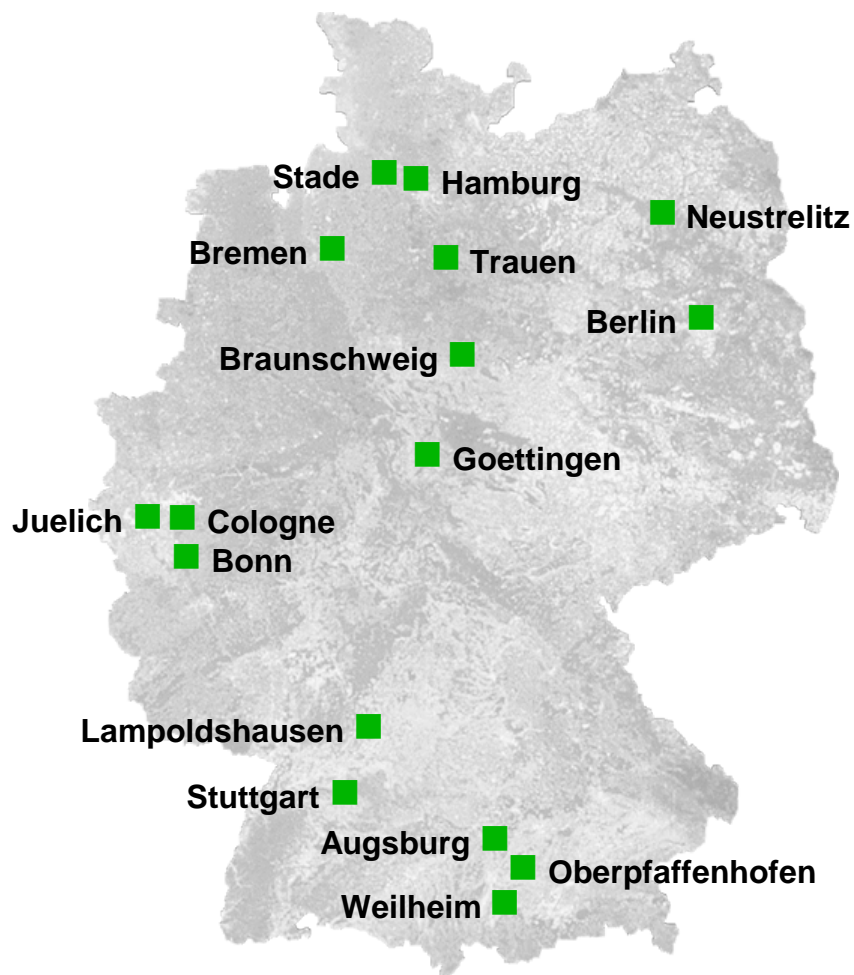
- Research Institution
- Space Agency
- Project Management Agency



Locations and Employees

7400 employees across
32 institutes and facilities at
■ 16 sites.

Offices in Brussels,
Paris, Tokyo, and Washington.



Tasks and Responsibilities within the DLR EEE Parts Section on behalf of the Space Administration

- Determination and prioritization of the national EEE parts demand
→ [National technology development and qualification program](#) → increasing EEE part availability
- Launching EEE part qualifications
- Performing qualification and requalification audits with manufacturers
- Establishing strategies to increase the availability of EEE parts in the frame of the [European programs](#) (ECI, ESCC ...)
- Representation of the German Space Administration, German manufacturers and users within the European Space Components Coordination (ESCC)
- EEE part conferences for user and supplier needs and interests consolidation



Topics of the EEE-part Conferences

Annual for users and suppliers, division into various priority topics

- Harmonization of the national technology development and qualification program
- EEE-part availability (and application of the QPL / EPPL)
- Qualification procedures
- Technology developments
- Identification of user needs
- Optimization of ESCC procedures
- Parts problems (alerts, export restrictions ...)



Harmonization of the National Technology Development and Qualification Program in Detail :

- To propose actions and tasks to improve the EEE parts availability
- To agree on actions and tasks
- To prioritize and approve the proposed action list
- To report on actions and tasks performed, their results, and their application
 - To increase the acceptance at customer level
 - To reduce the impact of export restrictions
- Supported by information web site (password protected only for German users, www.ibara.de)



DLR Way for Action Plan Consolidation

- Draft action plan as input for German EEE-part conference
- Discussion, harmonization and prioritization of user needs at this platform
- Identification of suitable manufactures
- Internal negotiations (budget, priorities, human resources, approvals ...)
- Establishing specifications if not available from ESCC
- ESCC harmonization (CTB input for AQP)
- Consolidated budget table = German action plan
- Contract placing and execution regarding to DLR process requirements
- Input to ESCC QPL and EPPL
- To report results and application of running or performed programs

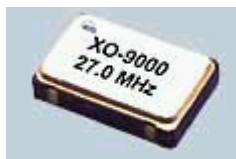


KVG Quartz Crystal Technology: Crystals and Oscillators



Crystals:

Type T807 in TO-5 Package: 8,0 -140 MHz qualified according to ESCC 3501, 3501/001, 3501/008, 3501/011, 3501/012 and 3501/018



Type T1507 in TO-8 Package: 2,5 - 50 MHz qualified according to ESCC 3501/002, 3501/009 and 3501/019

Oscillators:

DIL14 (4 Pins), Flat pack
XOs: 8,192 MHz - 125 MHz
VCXOs: 10 MHz - 90 MHz



Status Oscillators:

- Qualification finished successfully
- Test report available, DPA results to be updated
- Problems: cracks in the glass feed troughs of the Flat pack packages RGA values outside the specification
- Root cause: test adapter
- Note: qualification done based on DLR specifications



Vishay Electronic – Division Draloric:



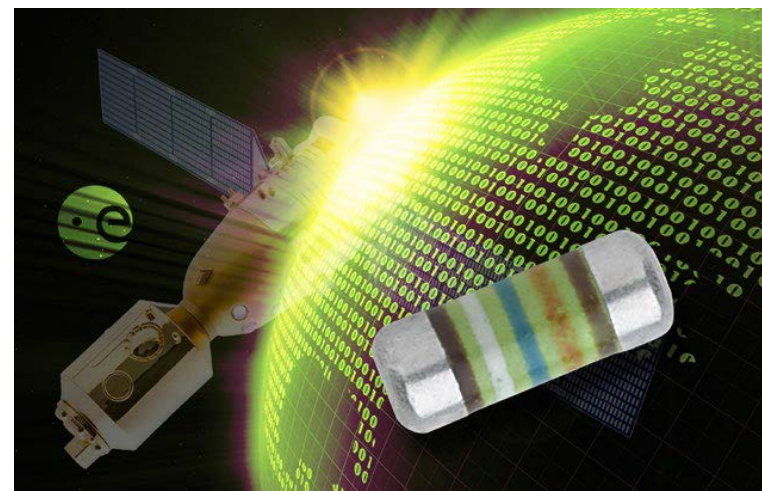
Fixed, Surface Mounted, Film, Non-hermetically Sealed Resistors MS1 & TNPS

- **Type MS1:**

- Hi-Rel. and high-performing thin film MINI-MELF resistor
- Advanced thin film technology
- Excellent electrical robustness and load-life stability
- Qualified according to ESCC 4001, 4001/022 since October 1999

- **Type TNPS**

- Hi-Rel. thin film chip resistor
- Excellent stability in extreme environmental conditions
- SMD packages (1206, 0805 and 0603)
- Qualified according to ESCC 4001, 4001/029 since May 2009
- EPPL Part I listed



Isabellenhütte Heusler GmbH & Co KG: Resistors Types SMP, SMR, SMS, SMT and SMV

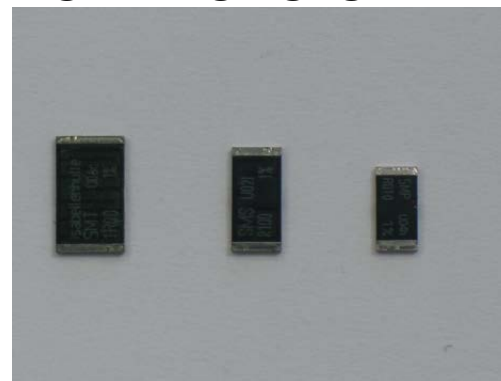
- Qualified according to ESCC 4001, 4001/027 and 4001/028 since 2008

SMR SMV



Package: 4723

SMT SMS SMP



Packages: 2817 / 2512 / 2010

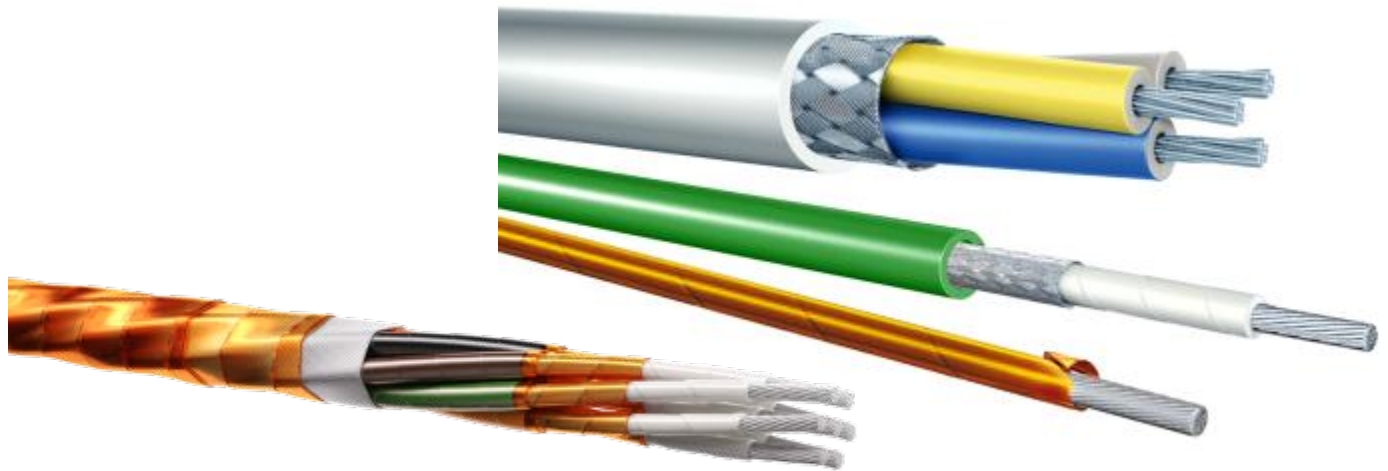
Style	Detail Spec. Variant	Range (Ω)	Tol. (±%)	TC (± 10 ⁻⁶ /°C) Applicable to All Variants	Power Rating (W)
SMP- 2010	001	0.005-1.000	0.5	Refer to ESCC Detail Specifications	1
SMR-4723	001	0.010– 4.7	0.5		3
SMS- 2512	002	0.003-1.000	0.5		2
SMT- 2817	003	0.004-2.000	0.5		3
SMV-4723	002	0.0022 - 1.0	0.5		3



Leoni Special Cables GmbH: Cables with Polyimide Insulations

LEONI

- Low frequency polyimide insulated wires and cables qualified according to ESCC 3901/3501/001, 3501/008, 3501/011
- Available in an shielded and unshielded Version
- Simplified cable harness production through clearly identifiable multicore color coding; Up to 7 cores
- Applicable for ARIANE 5, ATV, Galileo and further satellite systems

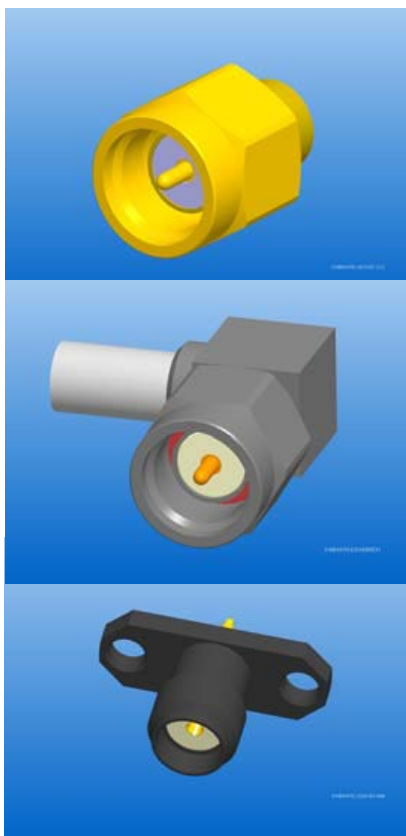


Rosenberger: RF Connectors

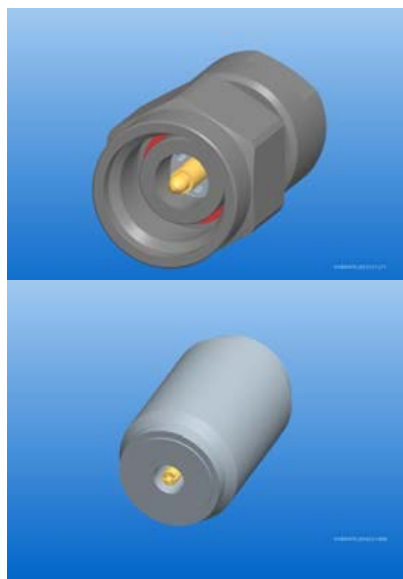
Types: SMA, SMA 2.92, SMP, TNC

Rosenberger

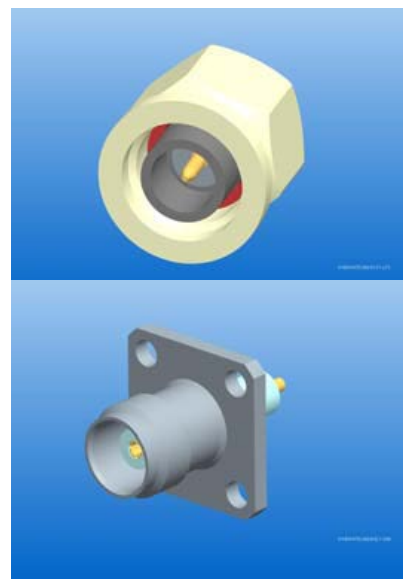
SMA



SMA 2.92



TNC



SMP



Rosenberger

Rosenberger: RF Connectors

Types: SMA, SMA 2.92, SMP, TNC

- **Overall status:**

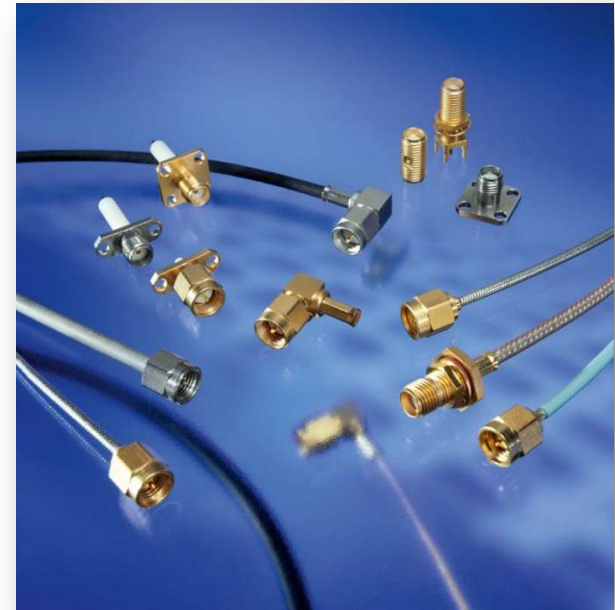
- Final report in preparation
- Findings and observations of last audit to be discussed
- Project formally closed

- **Status SMA, SMA 2.92 and TNC**

- Evaluation test reports approved by ESA / DLR
- Qualification test reports approved by DLR (ESA approval open)

- **Status SMP**

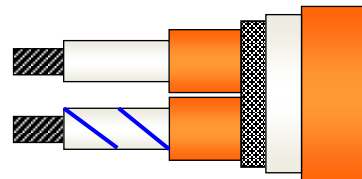
- Evaluation test report approved by DLR (ESA approval open)
- Qualification of SMP PCB connector and bullet DONE
- Qualification of SMP PCB connector and cable connector ongoing





Gore: Cables

- Offering Products with
 - Best-in-class electrical performance
 - Less weight
 - Easier handling
 - More flexibility & easier route-ability
 - Longer durability
 - Gore provides cables qualified according to the
 - Generic specifications ESCC 3901 & ESCC3902
 - Detail specifications ESCC 3901/009, 3901/017, 3901/019, 3901/021, 3901/024, 3902/002, 3903/003
- NEW:** Qualification ongoing on according to ESCC3901/025 based on type CSC



Tesat Spacecom: COAX Circulators / Isolators

- **ESCC Qualification of COAX Circulators / Isolators (Ku-band, 10.7 - 12.75 GHz)**

- **Activities:**

- Phase 1: Evaluation
- Phase 2: Qualification

- **Status:**

- PID (Process Identification Document), ESCC detail specifications and evaluation test plan drafts available
- Redesign of evaluation samples was necessary
- Changes of design: gap welding changed to lead bonding, different package material; SMA connector with DC edge; Ferrite lasts over complete frequency range; higher temperature stability; one design for whole frequency range
- Precap inspection done successfully
- S-parameters out of spec => NCR to be closed a.s.a.p.
- Delay: approx. 18 months => end of project: February 2015

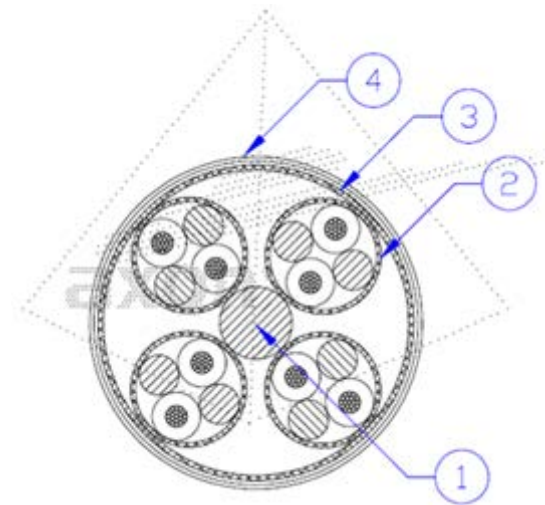
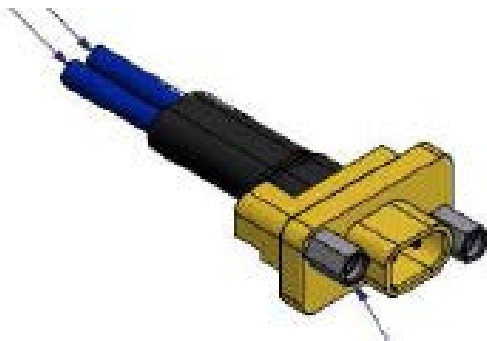


Axon: Wires, Cables, and Connectors



- **Axon:**

- French manufacturer with German facilities
- Offers several space qualified wires:
 - Low mass space wire (50 % mass reduced)
 - High data rate assemblies (harnesses) up to 10 GBit/s per pair
 - Thruster cables (high voltage, 280°C, 200 MRad)
 - Continuous high temperature cables
 - Nano-D connectors
 - Combo μ D connectors



Thank you for your Attention!

Dipl.-Ing. German
Guido Joormann Aerospace Center

Standardization and Quality and
EEE Components Product Assurance

Porz-Wahnheide, Linder Höhe
51147 Köln, Germany

 Telephone 02203 601-3724
Telefax 02203 601-3235
E-Mail guido.joormann@dlr.de

Dr.-Ing. German
Andreas K. Jain Aerospace Center

Head - Quality and
Standardization and Product Assurance
EEE Components

Porz-Wahnheide, Linder Höhe
51147 Köln, Germany

 Telephone 02203 601-2954
Telefax 02203 601-3235
E-Mail andreas.jain@dlr.de

Dipl.-Ing. German
Hans-Dieter Herrmann Aerospace Center

Standardization and Quality and
EEE Components Product Assurance

Porz-Wahnheide, Linder Höhe
51147 Köln, Germany

 Telephone 02203 601-4124
Telefax 02203 601-3235
E-Mail hans-dieter.herrmann@dlr.de

**All activities of the National
technology development and
qualification program of EEE
parts for space applications:**
http://www.dlr.de/qp/desktopdefault.aspx/tabid-3091/4699_read-6881/

