

**5 CERTIFIED PROCESS CAPABILITY APPROVALS**

The following Process Capability Approvals are certified.

**5.1 HERMETIC HYBRID LINES**

**5.1.1 KONGSBERG SPACE ELECTRONICS (KSE), NORWAY**

The Process Capability Approval (PCA) of the Hybrid Line of Kongsberg, Horten, Norway, has been certified by ESA in accordance with the requirements of ESCC Basic specification No. [2566000](#).

The associated PID includes Kongsberg’s manufacturing, assembly and test operations which have been approved for the supply of Hermetic Hybrid products for use in ESA space systems as a Category1, Option 2 Manufacturer, in accordance with ECSS-Q-ST-60-05C Rev.1

**5.1.1.1 *Contact Information***

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**5.1.1.2 *Process Capability Approval***

Certificate No.	Certified since:	Type Designation
384A	Nov 2022	Thin Film Hermetic Hybrid Microcircuits

**5.1.1.3 *Capability Abstract***

Kongsberg Space Electronics (KSE) hybrid manufacturing process capabilities are defined within the associated Process Identification Document (PID) NORS\HYBRID\GEN\MIF\PID1198 Is. 5C.

The process capability domain associated to the PID covers the KSE activities on design, manufacturing, testing, inspection, screening and quality assurance processes for thin film hybrid microcircuits used for space applications. Both medium and low power, RF and DC hybrid microcircuits are designed and manufactured.

The use can be on internal KSE equipment or sold to external customers.

The hybrids are manufactured by attaching active and passive components on thin film substrates, on metal carriers or directly into the package base, by conductive epoxy adhesives or by eutectic soldering:

- MMICs
- Digital/analog ICs
- Transistors
- Diodes
- Capacitors
- Resistors
- Inductors and transformers
- Thermistors
- Thin-Film circuits

Internal interconnections are performed by thermosonic bonding of wires or ribbons or by parallel gap welding. Hermeticity is achieved by resistive seam sealing under Nitrogen atmosphere. The packages are custom designed metallic or ceramic flat packages with a kovar seal ring and fitted with a kovar lid. The feed throughs may be glass or ceramic or of GPO/MDM type.

The repair provisions (element replacement, wire re-bonding, delidding-relidding) are given in the PID.

Hybrid microcircuits are screened, according to the PID in accordance with the requirements of ESCC Basic specification No. [2566000](#). The procurement of passive and active parts, materials and piece parts are performed according to procurement specifications and incoming procedures, as detailed in PID.

In-house process capabilities:

- Thin film substrate patterning
- Static and dynamic thin film resistors trimming
- Manual and automatic pick-and-place assembly
- Manual and automatic wire bonding
- Seam sealing
- Internal Expertise Laboratory: Destructive Physical Analysis (DPA), Elements characterizations, Failure analysis.