

## 5 PROCESS CAPABILITY APPROVALS

### 5.1 THALES ALENIA SPACE, TOULOUSE, FRANCE. HIGH FREQUENCY HYBRID LINE

The Process Capability Approval (PCA) of the Hybrid Line of Thales Alenia Space (TAS), Toulouse, France has been certified by ESA in accordance with the requirements of ESCC Basic specification No. [2566000](#).

The associated PID includes TAS' 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 Contact Information

Address	ESCC Chief Inspector
Thales Alenia Space 26, Av. J.-F. Champollion BP33787 31037 Toulouse Cedex 1 France	Mr. M. Lambert Tel. +33 5 3435 6338

#### 5.1.2 Process Capability Approval

Current PCA Certificate No.	Certified since:	Type Designation
332	May 2015	High Frequency Hybrid Line

#### 5.1.3 Capability Abstract

The associated Process Identification Document (PID) is Ref. 39.731.284/924, Issue 08/-.

This PCA covers the TAS-Toulouse activities on manufacturing, tuning, testing, inspection and Quality Assurance of High-Frequency Hermetic Hybrid technologies, used for high power and low power modules of TAS space equipment and sub-systems.

According to the PID, the hermetic modules are manufactured by encapsulation, of several types of active and passive components, inside customized hermetic package : MMICs, ASICs and digital/analog ICs, Bare transistors, Diodes, Capacitors, Resistors, Inductors and transformers, Thermistors, Thin-Film and Thick-Film circuits.

Wires and ribbons are used for interconnection between the dies, and between dies and substrates or package.

Hermetic cavities are generated with lid sealing under inert gas atmosphere. Depending of the application, the hermetic package is metal-based or HTCC based, with glass or ceramic for DC or RF feedthroughs.

Then, modules are screened, according to the PID and to the generic procurement specification ECSS-Q-ST-60-05C Rev. 1.

The repair provision conditions (element replacement, re-bonding, de-lidding ...), as well as the criteria for lot rejection are also given in the PID, in accordance with ECSS-Q-ST-60-05C Rev. 1.

The procurement of passive and active components, materials and mechanical parts are performed following internal procurement specifications and incoming instructions, as detailed in PID. The associated internal tests include bondability tests as well as user-LAT tests, as required by ECSS-Q-ST-60-05C Rev. 1.

For Hybrid Circuit Lot Acceptance Test (Hybrid LAT), TAS-Toulouse follows "Option 2", as defined in ECSS-Q-ST-60-05C Rev. 1. For this purpose, TAS-Toulouse has defined, for the Manufacturing Hybrid Line :

The generalization of Statistical Process Control of the manufacturing means,

The implementation of an Hybrid Line Management under the control of a Technology Review board (TRB). Organization, missions and responsibilities of this TRB is defined in an internal TAS instruction.

The implementation of Standard Evaluation Circuits (SECs), used for LAT acceptance. Several different SECs are requested to cover the whole range of hybrid technologies. These SECs are Flight Model Hybrids, sampled, and submitted to destructive acceptance tests, in accordance to PID and ECSS-Q-ST-60-05C Rev. 1.