ESCC PROCESS CAPABILITY APPROVAL LIST
(PCAL)

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DCR No.	CHANGE DESCRIPTION
1665	**Extension:** 332D, Thales Alenia Space (TAS), Toulouse (France). 341D, Tesat-Spacecom (Germany). **Editorial:** 343C, Thales Alenia Space (TAS), L'Aquila (Italy). ESCC Chief Inspector information has been updated 345B, Airbus DS Elancourt (France). References to certificate 345B have been deleted following the removal of the certificate itself in June 2023. See PCAL008 Is.12 for details.

FOREWORD

This document contains a list of suppliers of EEE manufacturing, assembly or test services that have been certified by the European Space Agency for Process Capability Approval (PCA) to the rules of the ESCC system with principal reference to ESCC Basic Specification no 25600.

The certification given to a supplier for Process Capability Approval does not include nor enable the ESCC Qualification of his products. Therefore, this listing of a PCA in this report just confirms the validity of the ESCC certification of approval within the limits of the applicable domain as described in a Process Identification Document (PID), but does not imply any declaration of individual product(s) qualification.

The electronic components produced within the domain described in the approved PID may need individual type (component) approval if intended for use in ESA and other spacecraft and associated equipment, in accordance with the requirements of the ECSS standard ECSS-Q-ST-60C.

Each PCA and its subsequent maintenance is monitored and overseen by the ESCC Executive. ESA certifies the PCA upon receipt of a formal recommendation raised by the ESCC Executive to state that all applicable ESCC requirements have been met by the pertinent manufacturer. The achieved PCA status is noted by an entry in this document, a corresponding entry in the European space components information exchange system, ESCIES, and the issue of a certificate to the certified manufacturer.

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1 PROMOTION

It is permitted to advertise the ESCC PCA status of a component supplier provided such publicity or advertisement does not state or imply that the related domain is the only approved one of that particular type, range or family.

2 PROCURER'S RESPONSIBILITY

When procuring EEE components produced within the limits of a certified PCA, the procurer is responsible for ensuring that the certification status is valid and that delivered components fulfill the specified contractual requirements in addition to those of the applicable ESCC specifications. The procurer is advised to utilize the ESCC non-conformance system, per ESCC Basic Specification No. 22800, in the event that a PCA-approved supplier delivers non-conforming components.

3 PCAL ORGANISATION

3.1 PROCESS CAPABILITY APPROVALS (PCA)

The individual PCA are listed in this document by manufacturer in alphabetical order. They may also be found on the ESCIES web site, https://escies.org. A PCA Abstract is provided to describe the main features of the certified domain.

The individual PCA are listed in this document per PCA types: manufacturing line of Hermetic Hybrid Microcircuits according to ESCC2566000, manufacturing line of non-Hermetic microelectronic modules according to ESCC2566001 and hermetic assembly, packaging and test services from assembly and test houses (ATH) according to ESCC2567000 requirements.

3.2 MANUFACTURER

Contact information and plant locations are indicated in the individual PCA listings Contact information may also be found in the ESCC PCAL section of the ESCIES web site, https://escies.org.

4 TABLE OF PROCESS CAPABILITY TECHNOLOGIES

PCA Domain	Technology	Specification	Supplier	Cert. No.
Hermetic Hybrid	Thick Film, Hermetic and HTCC Hermetic, low power, single cavity, Hybrids.	ESCC 2566000	Safran Electronics and Defense, F	346C
Hermetic Hybrid	Microwave Hybrid Integrated Circuits (MHIC) and High Density Integrated (HDI) RF Systems in Package (RF-SiP) using LTCC multilayer technology	ESCC 2566000	Tesat Spacecom, G	341C
Hermetic Hybrid	Low Frequency and Power Hybrid Line	ESCC 2566000	Thales Alenia Space, B	349A
Hermetic Hybrid	High Frequency Hybrid Line	ESCC 2566000	Thales Alenia Space, F	332D
Hermetic Hybrid	Hybrid Integrated Circuits (MHIC) product line and LTCC Integral Substrate Package (ISP) Hybrid Integrated Circuits	ESCC 2566000	Thales Alenia Space, I	343C
Hermetic Hybrid	Thin Film Hermetic Hybrid Microcircuits	ESCC 2566000	Kongsberg Space Electronics, N	384
Non-hermetic Module	3D Stacking Technology Modules	ESCC 2566001	3Dplus, F	351C
ATH	Hermetically Encapsulated Discrete Semiconductor Components in SMD and TO Packages.	ESCC 2567000	First Sensor Lewicki, G	379

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

Address	ESCC Chief Inspector
Kongsberg Space Electronics Knudsrødveien 7 N-3189 Horten Norway	Rolf Johannessen Rolf.Johannessen@kongsberg.com

5.1.1.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
384	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.

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 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.

5.1.2 SAFRAN ELECTRONICS & DEFENSE, FRANCE

The Process Capability Approval (PCA) of the Hybrid Line of Safran Electronics & Defense in Valence, France, has been certified by ESA in accordance with the requirements of ESCC Basic specification No. 2566000.

The associated PID includes Safran Electronics & Defense'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 1 Manufacturer, in accordance with ECSS-Q-ST-60-05C Rev.1

5.1.2.1 Contact Information

Address	ESCC Chief Inspector
Safran Electronics & Defense 95 route de Montélier BP234 26002 VALENCE FRANCE	Mr. Stephane BLACHE stephane.blache@safrangroup.com

5.1.2.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
346C	Dec. 2016	Thick Film, Hermetic and HTCC Hermetic, low power, single cavity, Hybrids

5.1.2.3 Capability Abstract

SAFRAN ELECTRONICS & DEFENSE's hybrid manufacturing line capabilities are defined within the associated Process Identification Document (PID) AQA 511 rev AC.

This PID describes hybrid assembly, packaging, production screening, test and quality assurance processes for Medium and Low power Hybrids Circuits using multilayer Thick film and HTCC (High Temperature Cofired Ceramics) technology.

Hybrids are used in equipment like power supplies, Video treatment, low noise amplifiers, data link electronics for telecom or scientific systems…

The hybrids are screened in house according to the PID. Regarding the Lot Acceptance Test SAFRAN ELECTRONICS & DEFENSE is compliant to Option 1 as default, but under customer agreement also the Option 2 can be applied (TRB, SPC, SEC).

According to the PID, the hybrids circuits are manufactured by encapsulation, of several types of active and passive components reported inside customized hermetic package: ASICs and digital/analog ICs, Transistors, Diodes, Capacitors, Resistors networks, Optocouplers, Magnetic devices, Thermistors. The PID includes technologies and processes covering Rakon hybrid oscillator.

The choice, definition and procurement of active and passive chips, material and mechanical parts, the incoming inspection and the User-LAT test are performed according to custom specifications or PID procedures.

In-house process capabilities:

- •Multilayer thick film printing
- •Static and dynamic thick film resistors trimming.
- •Single or double-sided hybrids
- •Bare dices and SMT components: automatic pick-and-place assembly
- •Automatic Wire bonding.
- •Seam sealing
- •Mix technologies on same hybrid circuit (HTCC+Thick film+Reflow soldering)
- •Internal Expertise Laboratory: Destructive Physical Analysis (DPA), Elements characterizations, Failure analysis

5.1.3 TESAT SPACECOM, GERMANY

The Process Capability Approval (PCA) of the Hybrid Line of Tesat Spacecom, Backnang, Germany, has been certified by ESA in accordance with the requirements of ESCC Basic specification No. 2566000.

The associated PID includes Tesat'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

5.1.3.1 Contact Information

Address	ESCC Chief Inspector
Tesat-Spacecom GmbH & Co. KG Gerberstraße 49 D-71522 Backnang Germany	Dr. – Ing. Jens Werner

5.1.3.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
341D	July 2016	Microwave Hybrid Integrated Circuits (MHIC) and High Density Integrated (HDI) RF Systems in Package (RF-SiP) using LTCC multilayer technology

5.1.3.3 Capability Abstract

TESAT's microwave hybrid manufacturing line capabilities are defined within the associated Process Identification Document (PID) 63.0200.005.00PID, Issue L.

This PID describes hybrid assembly, packaging, production screening, test and quality assurance processes for Microwave Hybrid Integrated Circuits (MHIC) and for High Density Integrated (HDI) RF-Systems in Package (RF-SiP) using LTCC multilayer technology. The manufacturing and screening lines are highly automated and provide up to man-less 24/7 operation mode.

The TESAT buried microwave technology offers the highest possible degree of circuit integration at extreme electromagnetic shielding levels.

The packaging standard is hermetic sealing but non-hermetic packaging has also been evaluated. Sealed packages are metal-ceramic based and apply thin-film, or LTCC technology.

Such hybrids are applied in various TESAT space equipment like linearizers, channel amplifiers, frequency converters, low noise amplifiers, SSPAs, modulators, data link electronics, DC-controllers and optical communication systems (likely the hermetic variants) but also in commercial terrestrial applications (non-hermetic variants). The frequency range reaches up to V-band.

TESAT hybrids are suited for radar applications (T/R-modules, TRX-modules for satellite constellations or high throughput satellites) or SSPA building blocks for beam-forming antennas.

TESAT's microwave hybrid manufacturing services are offered in-house and also externally (http://tesat.de/en/services/microwave-hybrid-manufacturing).

All space modules are screened according to ECSS-Q-ST-60-05C including burn-in and life test monitoring. No standard high and low temperature tests for electrical measurements are carried out.

5.1.4 THALES ALENIA SPACE, BELGIUM

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

The associated PID includes TAS' production flow (manufacturing, assembly and test operations which has been approved for the supply of Hermetic Hybrid products for use in ESA space systems as a Category1, Option 1 Manufacturer, in accordance with ECSS-Q-ST-60-05C Rev.1

5.1.4.1 Contact Information

Address	ESCC Chief Inspector
Thales Alenia Space Rue Chapelle Beaussart 101 B-6032 Mont-sur-Marchienne (Charleroi) Belgium	JD. Carton P. Deporte (deputy) Tel. +32 71 44 27 66

5.1.4.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
349A	April 2018	Low Frequency and Power Hybrid Line

5.1.4.3 Capability Abstract

The associated Process Identification Document (PID) is referenced 9100.0683 Issue 8.2

The PCA covers the TAS-B activities in the field of manufacturing, testing, screening and Quality Assurance of Low-Frequency and Power Hermetic Hybrid technologies, produced to be embedded in modules assembled on TAS space equipment and sub-systems. TAS-B also delivers hybrids in direct to external customers (DC/DC converters…).

According to the PID, the hermetic modules are designed and manufactured for the integration of function as "thick film" MCMs. These hybrids integrate several types of active and passive add-on parts, inside customized hermetic package: analogic and digital ICs, ASICs, bare chips (transistors & diodes), Capacitors, Resistors, Inductors and transformers, Thermistors, Thin-Film and Thick-Film circuits. Various types of wires are used for interconnection on dies and substrates or package (Al, Au, Cu).

Various types of sealing are available to obtain a hermetic cavity under inert gas atmosphere. Depending of the application, the hermetic package is made of metal (Kovar or Alumium) with glass or ceramic feedthroughs. The use of ceramic HTCC package is also part of the PCA.

At the final step of production, hybrid 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 assured according to internal procurement specifications and incoming instructions, as detailed in PID. The associated internal tests namely include bondability, shear tests, and user-LAT carried out per ECSS-Q-ST-60-05C Rev. 1.

In matter of LAT, TAS-B validates the hybrid lots produced according to “Option 1” of ECSS-Q-ST60-05C Rev. 1.

5.1.5 THALES ALENIA SPACE, FRANCE

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

5.1.5.1 Contact Information

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

5.1.5.2 Process Capability Approval

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

5.1.5.3 Capability Abstract

The Process Capability Approval (PCA) of the Hybrid Line of Thales Alenia Space (Toulouse) has been renewed in accordance with ESCC Basic Specification n° 2566000 requirements. The associated Process Identification Document (PID) is Ref. 39.731.284/924, Issue 12/-.

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, delidding …), as well as the criteria for lot rejection are also given in the PID, in accordance with ECSS-Q-ST-60-05C Rev. 1.

Procurements 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 bond ability tests as well as user-LAT tests, as required by ECSS-QST-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 a 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.

5.1.6 THALES ALENIA SPACE, ITALY

The Process Capability Approval (PCA) of the Hybrid Line of Thales Alenia Space (TAS), L'Aquila, Italy, 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

5.1.6.1 Contact Information

Address	ESCC Chief Inspector
Thales Alenia Space Zona Industriale Frazione di Pile (snc), 67100 L'Aquila Italy	Mr. V. Crinò Tel. +39 0862 707 313

5.1.6.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
343C	October 2016	Hybrid Integrated Circuits (MHIC) product line and LTCC Integral Substrate Package (ISP) Hybrid Integrated Circuits

5.1.6.3 Capability Abstract

The PID PCP-14-60-013 Iss.G covers the TASinI L'Aquila activities on manufacturing, tuning, testing, inspection and quality assurance of Microwave Hybrid Integrated Circuits (MHIC's), LTCC Low Frequency and LTCC Integral Substrate Package (I.S.P.) Hybrid Integrated Circuits, installed on space Units Hardware for TAS Equipment, Sub-System and Antennas.

The hybrids manufactured in L'Aquila have customized packages and they can be made by means different technologies, according specific need and performances, as kovar flat packages with glass seals, mechanical housing with brazed glass or ceramic feed-through or connectors or as Integral Substrate Package (ISP) based on Low Temperature Ceramic Cofired (LTCC) or High Temperature Ceramic Cofired (HTCC).

The hybrids housing can be populated by Thin Film Al2O3 or LTCC ceramic substrates, manufactured, on a dedicated line in TASinI L'Aquila as reported in the PID, glued or brazed on the MHIC housing.

The hybrids are populated with a lot of active and passive components selected to meet specific functions and performances: MMICs , ASICs, SRAMs, Digital Analog and RF ICs, Transistors, Diodes, Capacitors, Resistors, Inductors, Circulators and Thermistors. These components are mounted on the substrates by dispensing of different epoxy adhesive or by brazing process.

The interconnections among parts and substrates are made by wiring or ribbons in different materials and size and using different techniques.

The thermal dissipation for the most critical devices is managed by the use of heat spreader glued with high thermal conductive adhesive or brazed onto metal carrier.

Hermetic cavity is generated by lid sealing process, Seam or Laser Welding techniques, in inert gas atmosphere.

The procurement of active and passive chips, material and mechanical parts , the incoming inspection and the User-LAT test are performed according to dedicated procurement specifications or procedures reported in the PID and in conformance to ECSS-Q-ST-60-05C

5.2 NON-HERMETIC MODULES LINES

5.2.1 3D PLUS, FRANCE

The Process Capability Approval (PCA) of the Production and Test Line of 3D PLUS in Buc, France, has been certified by ESA in accordance with the requirements of ESCC Basic specification No. 2566001.

The associated PID No. 3300-0546 issue 13 includes 3D PLUS' manufacturing, assembly and test operations which have been approved for the supply of non-hermetic modules for use in ESA space systems.

5.2.1.1 Contact Information

Address	ESCC Chief Inspector
3D plus 408, rue Hélène Boucher – Z.I. 78532 BUC Cedex France	Mr. Loïc LE ROY loic.le.roy@3d-plus.com

5.2.1.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
351C	Nov. 2017	3D Stacking Technology Modules

5.2.1.3 Capability Abstract

The associated Process Identification Document (PID) is Ref. 3300-0546-14 (PID Rev.14).

Since the Rev.11 of the PID, ESCC N°2566001 standard is the reference for the definition and evolution of the Process Capability Approval (PCA). This PCA covers the 3D PLUS Buc activities on manufacturing, tuning, testing, inspection and Quality Assurance of 3D stacked products used for 3D PLUS catalogue and custom products.

According to the PID, the 3D PLUS modules are manufactured by stacking several layers of active and passive components. Two manufacturing flows are defined as follows:

- Flow 1 for the stacking of memories with TSOP packages.
- Flow 2 for the stacking of thin PCBs (Flex) populated with EEE components. These components are assembled by soldering when used in packages or by wire bonding when used in dice form.

Flow 2 allows a large diversity of packages (TSOP, PQFP, FBGA…) enabling the design and manufacturing of complex products.

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

The repair provision conditions as well as the criteria for lot rejection are also given in the PID.

The procurement of passive and active components, materials and mechanical parts are performed following internal procurement specifications and incoming instructions, as detailed in PID. Commercial EEE Active components

The procurement of passive and active components, materials and mechanical parts are performed following internal procurement specifications and incoming instructions, as detailed in PID. Commercial EEE active components evaluation is in conformance with ECSS-Q-ST-60-13C standard.

For Module Lot Acceptance Test (Module LAT), 3D PLUS follows the ECSS-Q-ST-60-05C adapted to non-hermetic and cavity free modules.

5.3 ASSEMBLY AND TEST HOUSES (ATH)

5.3.1 FIRST SENSOR LEWICKI, GERMANY

The Process Capability Approval (PCA) of ATH services from First Sensor Lewicki in Oberdischingen, Germany, has been certified by ESA in accordance with the requirements of ESCC Basic specification No. 2567000.

5.3.1.1 Contact Information

Address	ESCC Chief Inspector
First Sensor Lewicki GmbH Allee 35 89610 Oberdischingen, Germany	Mr. Jürgen Däubler juergen.daeubler@te.com

5.3.1.2 Process Capability Approval

Certificate No.	Certified since:	Type Designation
379	March 2022	Hermetically Encapsulated Discrete Semiconductor Components in SMD and TO Packages

5.3.1.3 Capability Abstract ATH service for hermetic discrete components

First Sensor Lewicki´s assembly and test capabilities are defined within the associated Process Identification Document (PID) FSL797000-002 PID Issue D.
This PID describes discrete components assembly, packaging, screening, test and quality assurance processes for hermetic encapsulated n-channel power MOSFETs in SMD and TO packages.

Hermetic power MOSFETs form a key component in many applications such as general power supply of systems and sub-systems, DC-DC converter, motor control, etc.

The selection, definition and procurement of bare dice and packages, as well as the performance of incoming inspection and LAT tests are carried out according to customer-specific specifications or PID procedures.

For n-channel power MOSFETs, FSL predefined levels of service to our customers according to the Process Identification Document (PID) FSL797000-002 PID Issue D:

-Service level A contains the assembly and process capability approval testing in accordance with the requirements of ESCC Basic specification No. 2567000.

-Service level B supplements service level A with an addition screening in accordance with the requirements of ESCC Basic specification No 5000.

-Service level C includes a lot validation testing in accordance with the requirements of ESCC Basic specification No 5000 to service level B.

Only service level A is covered by the ESA certification.

In-house process capabilities:

-Bare dices components: automatic pick-and-place assembly
-Solder die attach
-Automatic wire bonding
-Application of die coat for high voltage components
-Parallel seam sealing (for SMD and rectangular TO packages)
-Projection welding (for circular TO packages)

Screening of n-channel power MOSFETs according to ESCC5000 including environmental and mechanical tests, electrical tests, endurance tests and assembly tests.