Supplier Quality Manual

Connect to our website and feel free to contact our technical support team for any assistance.

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Contents

1. Document Control

1.1. Sign Off:

Action	Name	Section	Role
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1.2. Revision Tracking:

Review/Amendment Log				Change Recommended By	Change Reviewed By	Change Approved By
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2. Abbreviations:

Abbreviations	Definition
PPM	Parts Per Million
NCR	Non-Conformance Report
ME	Mechanical Engineer
SQA	Supplier Quality Assurance
PCB	Printed Circuit Board
MSD	Moisture Sensitive Device
SMT	Surface Mount Technology
FTA	Fault Tree Analysis
SPC	Statistical Process Control
MSA	Measurement System Analysis
MP	Mass Production
ISO	International Organization for Standardization
IATF	International Automotive Task Force
AIAG	Automotive Industry Action Group
IPC	Institute for Printed Circuits

CLP	Classification, Labelling, Packaging
Cp, Cpk	Process Capability Indices
Cm, Cmk	Machine Capability Indices
CQI	Continuous Quality Improvement
ELV	End of Life Vehicles
ESD	Electro Static Discharge
EU	European Union
FMEA	Failure Mode and Effect Analysis
FMEDA	Failure Mode Effect and Diagnostic
GHS	Globally Harmonized System
IEC	International Electrotechnical Commission
AOD	Accept on Deviation
ASIL	Automotive Safety Integrity Level
AEC	Automotive Electronics Council
IMDS	International Material Data System
LED	Light Emitting Diode
PSO / PSR	Product Safety Officer/Product Safety Representative
PCN	Product Change Notification
R@R	Run at Rate
PTC	Pass Through Characteristics
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
RFQ	Request For Quote
SDS	Safety Data Sheets
SCR	Supplier Change Request
SIL	Safety Integrity Level
VDA	Verband der Automobilindustrie

KPI	Key Performance Indicators

3. Introduction

At Cavalier Wireless we consider our suppliers as essential partners in delivering high-quality products to our customers. This Supplier Quality Manual defines the requirements, expectations, and procedures to ensure consistent quality and performance across the supply chain. The purpose of this manual is to establish a common understanding of the quality standards that must be met by all suppliers, fostering continuous improvement, compliance, and mutual success.

4. Purpose

This manual defines the quality expectations, requirements, and standards that suppliers must meet to ensure products and services consistently meet Cavalier Wireless's quality, reliability and regulatory standards. Continuous deployment and strict enforcement of the policies and procedures included in this manual is a mandatory condition to the relationship between Cavalier Wireless and its Suppliers partners.

5. Scope

(IATF 16949- Section 1.1)

The Cavli Supplier Quality Manual is valid for the supply of production materials, software and Aftermarket products. It is also valid for services that affect customer requirements such as sub-assembling, sequencing, sorting, rework, e-beaming and calibration services. It applies to all Suppliers

along the supply chain providing products to Cavli. It is also applicable for customer directed Suppliers (directed buy). Cavli Suppliers are expected to extend the requirements of Cavli CSR to their own Suppliers and sub-Suppliers. Cavli provides this document in English. The English version is binding. Translations in other languages are not permitted.

6. Quality Management System (QMS)

(IATF 16949- Section 4)

6.1. System Requirements

Supplier's must maintain an effective quality management system, set up according to the standards and regulations of ISO9001 / IATF 16949, is the preference for Supplier relations with Cavli.

The effectiveness of the Quality Management (QM) system should be reflected by:

- Continuous and verifiable improvement of processes, procedures, and products
- Delivered quality
- Delivery reliability
- Prompt and effective implementation of corrective actions
- Communication at all levels
- Appropriate and timely processing of new and revised projects

The goal of this quality management system is to achieve the "Zero-Defect" target. The minimum requirement is certification according to ISO 9001 by an accredited certification body. If not yet accredited to IATF 16949, those Suppliers shall have a plan to achieve certification. The Supplier shall inform Cavli immediately if the certificate:

- has been revoked
- has expired without a successful recertification
- has been temporarily placed on suspension

If no recertification is planned, the Supplier shall inform Cavli, at least 3 months prior to the expiration date. After a successful recertification, new certificates shall be uploaded to the Cavalier Wireless SQA. It is the responsibility of the Supplier to ensure that each Cavli receiving plant has been informed about the new certificate. Certification shall be provided by accredited certification bodies.

Supplier Development of Specially Designated Small Sub-Suppliers of Direct Automotive Product and Materials (Normative Reference: MAQMSR)

When a Supplier has a Sub-Supplier that (i) is so small as to not have adequate resources to develop a system according to ISO 9001 / IATF 16949 or (ii) supplies non-engineered products, certain specified elements may be waived by Supplier. In the above, 'Small' refers to the volume supplied to the automotive industry or to the Sub-Supplier's annual sales volume. Supplier shall consistently apply the assessment criteria below to determine the specially designated Sub-Suppliers to which this provision may apply. At a minimum, Supplier shall (i) assess the Sub-Supplier's size, (ii) dollar value of the business, (iii) type of products supplied, (iv) quality system, (v) manufacturing and delivery systems capability, and (vi) any risk to Cavli that could be caused by the Sub-Supplier's failure to develop a quality system that satisfies ISO 9001 / IATF 16949. In addition, Supplier shall ensure that Sub-Supplier(s) develop a quality management system that facilitates defect prevention, monitoring, and improvement.

6.2. Quality Objectives

(IATF 16949: section 6.2)

The Supplier shall ensure that quality objectives to meet customer requirements are defined, established, maintained and reviewed for relevant functions, processes, and levels throughout the organization. In the context of quality planning, the Supplier is expected to develop a "Zero-Defect Strategy" and take all necessary actions in order to achieve the "Zero Defect" target. If the quality performance has a potential to impact the safety, quality or delivery of products or any logistics impact or issues, then the Supplier shall immediately inform all possibly impacted Cavli receiving plants and other involved parties in the supply chain to Cavli.

6.3. Environment

(IATF 16949: section 8.2.2.1)

Effective environmental management, which ensures compliance with the respective applicable environmental regulations and improves continuously and efficiently the environmental conditions of the Supplier, is an essential contribution towards supply security. Cavli is committed to the protection of the environment. We expect our Suppliers to show voluntary commitment to environmental protection by implementing an environmental management system. Suppliers operating foundries, galvanizing and paint

shops, manufacturers of Printed Circuit Boards (PCB), primary and secondary cells, electronic components or performing any surface treatment using chemicals or dyes, resins, leather etc., grease and oil shall provide a certificate according to ISO 14001 or an equivalent system. If this certificate is not available, then a time schedule for certification needs to be presented. Product-related environmental and Safety Data Sheet requirements:

All supplies shall meet applicable legal, environmental and import regulations (e.g. EU REACH (EC) No. 1907/2006, EU ELV ACSR 2000/53/EC. Additional data (e.g. energy consumption and emissions) may be requested for life cycle assessment of Cavli products. Suppliers shall submit Safety Data Sheets (SDS) for materials and mixtures, in accordance with the United Nation's Globally Harmonized System (GHS) of Classification and Labelling of Chemicals and the European Classification, Labelling & Packaging (CLP) regulation. All electronics manufacturing suppliers should be certified with applicable ESD standard (ANSI/ESD S20:20 or IEC 61340).

6.4. Special Characteristics

(IATF 16949: section 8.2.3.1 & 8.3.3.3)

Cavli describes product and service requirements on the technical drawings, specifications and relevant purchasing documents. All characteristics shall be complied with. There are characteristics with higher risks which require special consideration. These are the "Special Characteristics". Deviations in these characteristics can seriously affect product safety, product lifetime, assembly capability, product functionality, quality and can violate official or legal regulations. Special Characteristics are specified by Cavli and documented on the drawings and/or specifications. They are to be identified as well, from the risk analysis of the Supplier, e.g. from the product and/or process FMEA, based on the Supplier's experience and knowledge.

6.5. Sub-Supplier Management

(IATF 16949: section 8.4)

Sub-Suppliers have a significant impact on the quality of the final product. Cavli Suppliers shall have a documented Supplier management system in place. Cavli Suppliers are responsible for the development of their sub-Suppliers. They shall have the necessary process, competence and resources to manage their

sub-Suppliers (including directed-buy Suppliers and outsourced processes) and monitor their performance. They shall also ensure that the sub-Suppliers comply with all the requirements contained in this CSR. An intent to change a sub-Supplier shall be communicated well in advance to Cavli. The change of a sub-Supplier can only be implemented upon prior approval by Cavli. Subsequently, Production Part Approval Process (PPAP) shall be performed. Cavli reserves the right to participate in audits and assessments of sub-Suppliers regarding quality management systems, processes, products etc. jointly with the Cavli Supplier, Cavli's customers or a third party assigned by Cavli. Advance notice shall be given. Cavli participation in a sub-Supplier audit does not absolve the Cavli Supplier from their responsibility to properly monitor and develop the sub-Supplier.

6.6. Product and Process Change Management

(IATF 16949: section 8.2.4/8.5.6)

The Supplier shall establish and maintain a documented process for the identification, evaluation, control, and implementation of changes affecting the product, manufacturing process, materials, tooling, equipment, test methods, packaging, or supply chain. Changes shall be managed in accordance with applicable requirements of the AIAG PPAP Manual and/or VDA Volume 2.

Prior to implementation, the Supplier shall assess the impact and associated risks of the proposed change, including changes initiated by sub-tier suppliers, and verify that the change does not adversely affect product quality, reliability, safety, regulatory compliance, fit, form, or function. Records of the risk assessment and validation activities shall be maintained.

Any change that deviates from the latest approved PPAP shall be communicated to Cavalier Wireless through a Product and Process Change Notification (PCN) and shall not be implemented without prior written approval from Cavalier Wireless. Following implementation of an approved change, a new PPAP submission and approval may be required before shipment of production material.

The PCN shall be submitted as soon as the change is identified and, unless otherwise agreed, at least twelve (12) weeks before the planned implementation date. The notification shall include details of the proposed

change, impact assessment, validation plan, implementation timeline, and any contingency or safety stock arrangements necessary to support uninterrupted supply.

Examples of changes requiring notification and approval include, but are not limited to:

- Relocation of production equipment, lines, or manufacturing operations to a new or existing facility.
- Changes to production layout, manufacturing processes, equipment, tooling, or inspection methods.
- Renewal or replacement of non-consumable tooling.
- Changes to raw materials, components, or packaging.
- Changes to product design, specifications, dimensions, tolerances, functionality, or appearance.
- Addition, replacement, or relocation of sub-tier suppliers.
- Outsourcing of manufacturing operations.
- Changes at sub-tier suppliers that may affect product quality, fit, form, function, reliability, or regulatory compliance.

Cavalier Wireless reserves the right to request additional documentation, testing results, validation reports, or other supporting evidence necessary to evaluate and approve the proposed change.

6.7. Product Safety

(IATF 16949: section 4.4.1.2)

The Supplier has producer responsibility (product liability) for their parts and processes, including parts or processes from sub-suppliers, which Cavli purchases to build their final products. Therefore, in order to prevent product liability risks, it is the responsibility of the Supplier to do everything in their power, in terms of organization and technical matters, to guarantee the product safety. The Supplier shall have a documented process for the management of "product safety" related products and manufacturing processes. Cavli requires their Suppliers to designate a Product Safety Officer and/or Product Safety and Conformity Representative (PSCR) to be in charge of all related tasks described in IATF 16949 section 4.4.1.2. Furthermore, the Supplier shall apply these requirements to their supply chain.

6.8. Communication with Cavli Customers

(IATF 16949: section 8.2.1)

Cavli expects Suppliers to be available for technical support within the context of discussions at customers, on their own premises, or at Cavli. Communication concerning Cavli products between the Supplier and customers of Cavli shall exclusively take place in agreement with Cavli.

6.9. Contingency Plans

(IATF 16949: section 6.1.2.3)

Suppliers shall identify and evaluate internal and external risks to all manufacturing processes and infrastructure equipment which are essential to maintain production output and ensure that CAVLI requirements are met. Suppliers shall develop a contingency plan for each Supplier manufacturing/shipping location which may disrupt product flow to Cavli. Cavli shall be informed immediately in the event of an actual disaster (e.g. interruption from externally provided products, services, recurring natural disasters, fires …). In this case, Suppliers shall provide Cavli access to Cavli's tools and/or their replacements. Suppliers are required to regularly review and update each contingency plan, at a minimum annually. The contingency plan should include comprehensive testing of the recovery actions and should address potential gaps in component/raw materials. The implementation of any change concerning these contingency plans shall be documented and is subject to the change management process.

6.10. Control of Reworked and Repaired Products

(IATF sections 8.7.1.4/8.7.1.5)

For rework and repair of products, the Supplier shall have a documented process and conduct a risk analysis (e.g. FMEA). Any repair or rework not included in the agreed Control Plan during the PPAP phase is considered as a process change. Cavli shall be notified in writing in advance. Written Cavli approval is required prior to implementation.

6.11. Disposition of Nonconforming Products

(IATF 16949: section 8.7)

The Supplier shall have a documented process for disposition of nonconforming products not subject to rework or repair. For product not meeting requirements, the Supplier shall verify that the product to be scrapped is rendered unusable prior to disposal, unless otherwise agreed with Cavli. Any component produced for supply to Cavli, not sent directly to Cavli or an authorized third party shall be destroyed in-house prior to recycling in order to make sure that the component may never be used in the intended application – unless otherwise agreed with Cavli. This includes scrap, parts produced during production trials, engineering sampling, and all setup and inspection pieces. The Supplier shall not divert

nonconforming product to service or other use without prior Cavli approval. Suppliers shall guarantee conformance to this practice and shall guarantee that any and all sub-suppliers will conform to this practice. Evidence of communication of this policy to sub-Suppliers shall be retained and presented to Cavli when requested.

6.12. Escalation Model "Supplier/Purchased Parts"

Suppliers providing Cavli with products and services that do not meet quality, delivery, or planning commitments and expectations are subject to enrolment in the escalation process to expedite improvement actions and visibility.

6.13. Lessons Learned

(IATF 16949: section 6.1.2.1/7.1.6/10.3)

Supplier shall have a process to document and share knowledge, generally gained by experience within the organization. For realizing an efficient product and process development process, the Supplier shall consider at a minimum, knowledge gained out of former projects, customer claims, recall actions, Supplier complaints, change and deviation requests, audits, rework, repair and scrap. The Supplier shall review and apply the Lessons Learned as a first step in the project. This process shall keep the focus on avoiding defects instead of detecting defects in the entire supply chain. The effectiveness is proven by continuous improvement of the production process reliability, supply quality and delivery performance.

6.14. Retention Periods

(IATF 16949: section 7.5.3.2.1)

The Supplier shall define and maintain retention periods for documents, records and reference samples. The applicable retention periods depending on the nature of the relevant documents and type of industry are described in the following standards:

Automotive Industry

- IATF (section 7.5.3.2.1) – Record Retention
- VDA 1 – Information Management, Documentation Control and Archiving
- AIAG (6) – Record Retention

These regulations and this summary do not replace legal requirements.

6.15. Marking of Customer's Property

(IATF 16949: section 8.5.3)

All tools for manufacturing, testing or inspection equipment belonging to Cavli or customers of Cavli shall be permanently marked to clearly show that they are property of Cavli or of the customer of Cavli. These tools shall only be used for Cavli products unless an authorization in writing exists. Failure to comply with tool identification requirements will result in delay or non-payment.

6.16. Customer Specific Requirements

(IATF 16949: section 4.3.2)

Suppliers are expected to comply with specific requirements of Cavli customers. General customer specific requirements are already included in this CSR and shall be implemented. Additional customer specific requirements issued by Cavli customers shall be communicated on a project basis. Their application shall be subject to an agreement between Cavli and the Supplier.

7. APQP Advanced Product Quality Planning/VDA Maturity Level Assurance

(IATF 16949: Section 8.1)

Cavli's objective is to involve Suppliers in quality planning for a new project at the earliest possible stage. Cavli always requires systematic planning from our Suppliers in the context of project management according to VDA Volume Material Level Assurance (Product Creation – Maturity Level Assurance for New Parts), or AIAG APQP, provided Cavli does not stipulate another procedure. This planning applies both to the parts made by the Supplier as well as to the Supplier's purchased parts. Cavli shall be notified of the project manager and the project team. For the respective part and/or project, the Supplier shall, at a minimum, implement the planning steps specified below (see sections 7.1 to 7.39). Each section describes a necessary planning item (APQP element). For parts produced and purchased by the Supplier (raw materials, external processing, sub-Suppliers), a status shall be drawn up which represents the individual

evaluations in summary and puts emphasis on individual critical items. Project-specific requirements which go beyond the contents of this CSR shall be agreed between Cavli and the Supplier.

7.1. Supplier Readiness

The early recognition and avoidance of quality risks is a key success factor for a flawless launch and stable serial supply. Cavli reserves the right to determine components of increased risk or special priority and initiate a Supplier readiness program for these components. The program shall be carried out by the Supplier in co-operation with Cavli.

7.2. Early Supplier Involvement

Depending on the project, Cavli will seek to involve their Suppliers at an early stage to carry out a simultaneous engineering. Cavli expects their Suppliers to actively participate in these simultaneous engineering activities if invited by Cavli. In such a case, a simultaneous engineering process shall be carried out, involving both Cavli and the Supplier. A list of necessary activities shall be created, with a clear responsibility for the Supplier or for Cavli. Commitment to implementation of these activities shall be documented and confirmed. The final result shall be assessed by Cavli for approval.

7.3. Lessons Learned/Knowledge Transfer

(IATF 16949: section 7.1.6)

Prior to filling out the feasibility study, the Supplier shall take all the relevant lessons learned and knowledge from previous or similar projects into consideration according to clause 1 – Lessons Learned.

7.4. Feasibility Study

(IATF 16949: section 8.2.3)

The Supplier shall analyze all technical documents (e.g. drawing, specifications, environment, statement of work, commodity specific and customer specific requirements …) as well as the Cavli General Terms and Conditions and this CSR as part of a contract review. The requirements are to determine and confirm:

- the feasibility of the design (for Suppliers with design responsibility),

• the ability to manufacture,

• the ability to measure, achieve and sustain process capability for special characteristics.

We expect our Suppliers to determine improvements in design, process and costs. The Cavli SQE may request the Supplier to consider issues such as packaging and shipping.

7.5. Planning Contents

(IATF 16949: section 8.1.1)

Cavli shall be notified of detailed activity planning in writing in advance.

7.6. Project Plan

(IATF 16949: section 8.1)

The Supplier creates a project plan based on the Cavli specified project milestones and submits it to Cavli. The Supplier shall report on a regular frequency specified by Cavli.

7.7. Statutory and Regulatory Conformity (Material Expectations)

Supplier shall provide, free of charge, samples, testing, environmental, and Safety Data Sheet (SDS) information within the timeframe stated by Cavli. SDS is required for bulk materials, raw materials, rust preventive, grease, lubricating oil, or any other chemical materials that are on, in, or part of an assembly provided to Cavli. Seller is liable for all damages and will pay all costs in case not following Cavli CSR.

7.7.1. Substances of Concern and Recycled Content

Supplier shall disclose the composition of all parts supplied, or proposed to be supplied to Cavli through IMDS.

7.7.2. Incoming Product Quality

Supplier shall ensure the quality of the parts it produces, its Sub-Supplier's quality and delivery performance (including those Sub-Suppliers directed by Cavli), and subcontracted services meet Cavli specifications and requirements. When Supplier determines incoming inspection of Sub-Supplier material is necessary, this activity shall be consistent with the risk and quality impact of the Supplier on Cavli product quality. Such incoming inspections shall include variables data, where appropriate, and be used as

a key indicator for Sub-Supplier quality management. Where high risk has been identified in the subcontracted process, Supplier shall ensure containment is in place to protect Cavli. For attribute data sampling, the acceptance level shall be zero defects.

7.7.3. Information for external providers – supplemental

The Supplier shall pass down all applicable statutory and regulatory requirements and special product and process characteristics to their Suppliers and require the Suppliers to cascade all applicable requirements down the supply chain to the point of manufacture. Suppliers shall evaluate the effectiveness of each of the applicable AIAG CQI special processes identified in the "Normative Reference Document" section of this document on an annual basis. Evidence of the scheduled self-assessments, identified auditors, self-assessment results with monitoring of progress on corrective actions shall be retained per the Suppliers-controlled record retention process.

7.7.4. Product Description

(IATF 16949: section 8.2.2)

Product description starts at a very early stage of the sourcing process (before the APQP phase) to ensure that all requirements from Cavli and Cavli's customer are captured and included in all relevant documents (e.g. technical specifications, drawings, internal standards …). All issues identified during the product description process shall be tracked by means of an agreed action plan. Dimensions not described in the data models (if applicable) but necessary from a production engineering point of view shall always be determined, specified and agreed (with Cavli) in order to avoid interferences and problems with manufacturing and assembly.

7.7.5. Cavli-Designated Special Characteristics

Cavli shall notify Supplier of any Cavli-Designated or Customer-Designated Special Characteristics to be used on control plans, drawings, FMEAs, etc. Supplier shall ensure use of these specific symbols.

7.7.6. Manufacturing Feasibility

Supplier responsibility is to check and confirm capacity with 20% flexibility (without any additional investment, from Cavli side) based on estimated lifetime non-binding project volumes provided by Cavli

within 2 weeks of receipt. Supplier is also responsible to present a recovery plan to achieve capacity at SOP of the project in case of capacity not confirmed. Supplier's capacity study shall include identification of the capacity constraints and evaluation of risk to Cavli. Supplier shall provide the results of studies to the Cavli. Once project reaches Start of Production, the Supplier need to ensure that capacity will be in place, based on confirmed/quoted volumes as per above rules. If at any time, the Supplier detects future capacity issues or constraints based on Cavli's forecast, it should immediately inform the Cavli buyer & procurement team.

7.8. Quality Objectives

(IATF 16949: section 6.2)

For measurement and evaluation of the achieved quality, internal project/product related quality objectives shall be defined by the Supplier. The Supplier shall monitor the KPIs at all times to meet the quality objectives set by Cavli.

7.9. Special Characteristics

(IATF 16949: section 8.3.3.3)

The Supplier shall identify and mark them in all relevant product and process documents, such as drawings, FMEA, risk analyses, work instructions, control plans and Cavli specific documents such as the Product Characteristic Matrix, Series Control Special Characteristics, etc. These characteristics require particular consideration including capable processes, error proofing, special controls and monitoring. Concerning the verification management documents for Special Characteristics, the extent of the retention period to be applied needs to be defined in accordance with the requirements.

7.10. Safe Launch Plan

The Supplier shall agree upon a Safe Launch Plan prior to the PPAP run.

7.11. Process Flow Chart

(IATF 16949: section 8.3.5.2)

The Supplier shall provide a Process Flow Chart for the entire process chain from receiving inspection to packaging and shipping. This process flow chart shall be presented to Cavli for common review. FMEA and Control Plan shall align with Process Flow Chart.

7.12. Operation Plan

(IATF 16949: section 8.3.5.2)

An Operation Plan shall be completed for all single components and assemblies. It shall include all information on process steps, internal/external transport, means of transportation, as well as the machines and operating materials to be used. Necessary drawings (e.g. for production stage, raw part as well as process descriptions) shall be issued.

7.13. Product and Process FMEA

(IATF 16949: section 8.3.5.2)

The Failure Mode & Effects Analysis (FMEA) shall be carried out to examine possible risks and their evaluation regarding severity, probability of occurrence, and the possibility of detection. These risks shall be minimized by introducing appropriate measures. The FMEA is thus an important instrument for preventing defects. The FMEA shall be carried out in a timely manner, so that the results and measures to be taken can still be incorporated into planning. A FMEA shall be used for all phases of the product life cycle, such as design, production, assembly, packaging, transport, customer usage, as well as recycling and waste disposal. The FMEA shall be used as a continuous improvement tool. FMEAs shall be developed and/or revised in the following cases, e. g.:

- development/production of new parts
- introduction of new manufacturing methods
- relocation of plants
- drawing changes
- process changes
- if defects occur
- lessons learned

Design FMEA shall be completed for all parts which are being designed within the responsibility of the Supplier. Upon request by Cavli, DFMEA shall be presented to Cavli by the Supplier. Process FMEA shall be completed for all process steps of a component. In particular, the results of the process FMEA and the special characteristics shall be taken into consideration as basis for the Control Plan.
Upon request by Cavli, a Process FMEA shall be presented to Cavli by the Supplier. The following topics shall be considered:

Failure simulation along the FMEA (Product and Process);
The identified failure modes within the FMEA shall be simulated on the shop floor after industrialization of the production process in order to verify if the failures are detected. Additional failure modes and other potential causes shall be identified and integrated into the FMEA.

Material mix-up;
The complete process chain during production, including the processes of the sub-Suppliers, shall be analyzed for risk potential concerning the mix-up of material. All necessary actions shall be taken in order to eliminate the risk of material mix up (e.g. implementation of efficient interlocking systems).

Management of part variants;
A system shall be implemented which eliminates the risk of a mix-up of similar looking parts. Control of scrap parts, rework parts, setup parts and reference parts must be detailed. This includes, in particular, the prevention of the mixing of suspect parts with good parts in special situations such as machine crashes, machine stoppage and restart.

Technical cleanliness;
Technical cleanliness shall be implemented in the FMEA based on the specific requirements. The sub-Suppliers, machine manufacturers and service providers have to be considered as well. The product and all processes shall be designed so that all the requirements are fulfilled.
By pass/Skip Process;
A system shall be designed and implemented to ensure that each process step can only be started if the previous one has been successfully completed.

Lessons Learned;

All lessons learned from similar processes and products shall be taken into account for the new project. Among other things, lessons learned documentation, records of all internal and external complaints, 8D reports, as well as preceding FMEA's shall be considered. Lessons Learned of sub-Supplier's issues have to be taken into account as well.

FMEDA (Failure Mode Effect and Diagnostic Analysis);

Cavli shall be notified in written form about risks in the safety related system.

Assessment:

An assessment of the FMEA process shall be performed according to the international harmonized standards of VDA and AIAG.

Implementing measures;

Risks which are identified with the help of a FMEA shall be minimized by taking appropriate measures.

To implement the measures, target dates and responsibilities shall be assigned in such a way that the measures can be taken before the start of production. The measures introduced shall be re-evaluated regarding their effectiveness. Cavli shall be informed promptly about any necessary design modifications.

7.14. Design and Development Review

When reviewing product design and development stages, Supplier shall participate in and execute APQP requirements. Suppliers of material containing embedded software shall retain documented information of its software development capability self-assessment (ref: IATF 16949, 8.4.2.3.1).

7.15. Design and Development Verification

Supplier shall perform design verification to show conformance to Cavli design validation and qualification requirements. At a component level, Supplier shall develop a qualification plan with the design engineering activity at Cavli. Go/No-Go results should be avoided and, where available, the actual value for variables data shall be recorded.

7.16. Test Planning/Development Release

(IATF 16949: section 8.3.4.2)

Suppliers with responsibility for product design shall create and execute a plan, according to which the design (development results) shall be tested to ensure that it meets the design specifications. This plan shall contain, among other things, information on the date, type, extent of the validation type, quantity of samples, etc. The difference between planning and realization (gap analysis) shall be evaluated.

7.17. Control Plan

(IATF 16949: section 8.5.1.1)

The Control Plan presents a planning tool for preventive process security. It is implemented by a team through systematic analysis of production, assembly and test processes. This team should be made up of employees from Planning, Manufacturing and Quality Assurance as well as other related departments. The results of product and process FMEAs, experiences with similar processes and products, as well as the application of improvement methods shall be taken into consideration in the Control Plans. In the product development process, the Control Plan shall be created for the phases of pre-series production, safe launch and series production. A Control Plan for prototypes shall be created if required by Cavli. For Special Characteristics, the sample plan frequency shall be based on quantity, e.g. 5 pieces out of 50.

The "Layout Inspection and Functional Testing/Annual Requalification" shall be included in the Control Plan. A detailed description of the process for preparing a control plan is included in VDA Volume 4 and in AIAG APQP.

7.18. Release of Product and Process Development

(IATF 16949: section 8.3.5)

The Supplier shall evaluate and document its releases for individual stages of product and process development. The results of these evaluations at each stage shall be described in the requested planning documents.

7.19. Co-ordination of Production Control

(IATF 16949: section 8.5.1)

As a basic principle, all product and process characteristics are important and shall be complied with. Special Characteristics require the proof of process capability. For this purpose, the Supplier shall monitor these characteristics with suitable methods, e.g. with statistical process control (SPC). If process capability

cannot be achieved, 100% inspection shall be carried out. Special Characteristics which are not measurable or only measurable by destroying the product shall be monitored and documented with suitable methods. Test intervals and the size of random samples shall be determined and planned. Planned monitoring of the characteristics in series production shall be agreed with Cavli. This information shall be documented in the Control Plan.

7.20. Planning and Procurement of Plant, Tools, Fixtures and Equipment

(IATF 16949: section 7.1.3.1)

All plant, facilities, tools, fixtures and equipment necessary for manufacturing are to be planned and procured to meet the contracted volume. They shall be in place, at the latest, by the initial sampling date. All other equipment, as well as internal and external means of transport, shall also be taken into consideration.

7.21. Cleanliness

(IATF 16949: section 8.2)

Based on the specific requirements, all types of contamination and their sources across the entire process chain must be considered in the FMEA. Alternatively, a specific cleanliness FMEA may be conducted by the Supplier. The sub-Suppliers, machine manufacturers and service providers must be considered as well. The product, packaging and all processes (storage, handling, transportation …) shall be designed in such a way that dirt emergence, dirt accumulation, dirt trailing and contamination are avoided. The use of harmful material with potential to impact the planned application shall be reported and requires an approval by Cavli. The Supplier is responsible for the cleanliness of both the parts and the packaging and shall take cleanliness specifications of Cavli into consideration. Packaging shall protect the parts against contamination. All packaging materials shall be recyclable, reusable or returnable – whenever possible. If required by Cavli, the Supplier shall ensure that the packaging for electronic parts conforms to the ESD specific requirements (Electro Static Discharge).

7.22. Inspection planning

(IATF 16949: section 8.5.1)

Based on the Control Plan, the Supplier shall create an inspection plan, which includes all characteristics to be inspected with the appropriate inspection equipment for each operation. In addition, the inspection frequency and type of documentation of the results shall be defined in the inspection plan.

7.23. Planning and Procurement of Inspection Equipment

(IATF 16949: section 7.1.5.1)

The Supplier determines the inspection method with the appropriate inspection equipment for all characteristics, shown on e.g. drawing, standards, specifications, etc. The procurement process shall be planned so that the necessary inspection equipment is available by the time of PPAP submission and suitability of the inspection process has been verified. External inspection and testing by service providers need to be planned as well. External service providers shall be accredited according to ISO/IEC 17025 or comparable national standards. The verification shall be carried out according to the requirements of VDA Volume 5 or AIAG MSA. In addition to the MSA results, Cavli may request or conduct an alignment of measurements in selected cases.

7.24. Capability studies

(IATF 16949: section 8.3.5.2/9.1.1.1)

The Supplier shall agree to conduct the machine capability study and process capability study according to one of the automotive standards VDA Volume 2, VDA Volume 4 or AIAG book SPC. The following explanation is according to VDA. Please note the alternative definition in AIAG.

Minimum requirements for capability indices:

- Machine capability/short-term process capability Cm/Cmk 1.67
- Preliminary process capability Pp/Ppk 1.67
- Process capability/long-term process capability Cp/Cpk 1.33

Deviating requirements shall be agreed by Cavli with the Supplier. The machine capability studies shall be planned in such a way that all verifications are available no later than at the time of the PPAP submission.

Preliminary process capability study:

The evaluation of preliminary process capability studies shall be presented from at least 25 sub-groups, each consisting of 5 samples, unless otherwise agreed with Cavli. For attributive inspection, sample size is minimum 300 consecutive pieces, unless otherwise agreed between Cavli and the Supplier. Containment, generally either 100% sorting or some form of mistake proofing, shall continue until such time that the process Ppk demonstrates preliminary capability unless otherwise agreed with Cavli.

Process capability study/Long-term process capability:

The long-term process capability study shall be submitted to Cavli as soon as it can be determined according to above mentioned requirements. Furthermore, the results of the process capability study shall be submitted upon request.

7.25. Identification of Statistical Tools

Supplier shall use the latest AIAG and/or VDA SPC manual for manufacturing process controls and the latest AIAG MSA for measurement system equipment management.

Centered production:

Centered production shall be the target for characteristics which can be adjusted. In case of noncapable processes, 100% inspection/sorting or some form of mistake proofing shall continue until such time that the process Cpk demonstrates long term capability.

The measurement uncertainty shall be deducted from the specification limits in the following cases:

- For features/characteristics which do not have process capability and therefore require 100% inspection.
- For processes which demonstrate sufficient process potential (Cp/Pp), but where the process is not centered and cannot be adjusted (e.g. stamping).

7.26. Planning of Preventive and Predictive Maintenance

(IATF 16949: section 8.5.1.5)

To ensure the delivery capability, a system for preventive and predictive maintenance on production equipment and tooling shall be developed. A maintenance plan shall be set out which includes the maintenance intervals and the extent of the maintenance. Consistent execution shall be documented in writing. In addition to defining preventive maintenance intervals, a contingency plan shall be established for all processes that can influence the ability to deliver, such as machines with capacity constraints and special tools.

7.27. Tool Inventory / Disposal

Supplier shall furnish a tool inventory of all Cavli-owned tools (active and inactive) in its possession (or in the possession of its Sub-Supplier(s)). The tool inventory shall be submitted to the Cavli buyer annually by January 31st.

The inventory shall contain the following information for each Cavli-owned tool:

- Tool part number(s) – typed in numerical order
- Current tool revision
- Description
- Date of parts last ordered
- Total cost of tool
- Quantity of parts produced from tool
- Remaining tool life
- Previous part number – if tool has been changed to produce a different part number

Cavli shall determine the disposition of all Cavli-owned tooling and such disposition shall be communicated

to Supplier in writing by Cavli and include a Return Material Authorization.

7.28. Status of Sub-Suppliers and Purchased Parts

(IATF 16949: section 8.4)

Sub-Suppliers have a significant impact on the quality of the final product. Cavli Suppliers shall have a documented Supplier management system in place. Cavli Suppliers are responsible for the development of their sub-Suppliers. They shall have the necessary process, competence and resources to manage their sub-Suppliers (including directed-buy Supplier and outsourced processes) and monitor their performance. An intent to change a sub-Supplier shall be communicated well in advance to Cavli. The change of a sub-Supplier can only be implemented upon prior approval by Cavli. PPF/PPAP is mandatory and shall be performed. Cavli reserves the right to participate in audits and assessments of sub-Suppliers regarding quality management systems, processes, products etc. jointly with the Cavli Supplier, an Cavli customer or a third party assigned by Cavli. Cavli participation in a sub-Supplier audit does not relieve the Cavli Supplier from their responsibility to properly monitor and develop the sub-Supplier.

If the Supplier assigns orders to a sub-Supplier, the sub-Supplier shall also fulfil the requirements of this CSR. This includes the implementation of a quality planning and feedback system with the sub-Suppliers according to the requirements of APQP Advanced Product Quality Planning. The use of qualified sub-Suppliers for the project shall be ensured. If requirements are not met, improvement plans shall be defined.

The implementation shall be guaranteed before PPAP approval of the entire product. Special processes shall be considered as well – CQI/Qualification of Special Processes. A list of all sub-Suppliers used shall be submitted to Cavli. A copy of each approved sub- Supplier's signed PPAP cover sheet shall be included with the Supplier´s PPAP submission. The status of the quality planning process shall be presented regularly. The activities shall be organized so that the Production Part Approval Process (PPAP) of the purchased parts is completed before the production process and product approval of the entire product.

7.29. Logistics Identification and Traceability Labels

(IATF 16949: section 8.1.1/8.3.5.1/8.5.4) & (IATF 16949: section 8.5.4.1)

Preservation - supplemental

Supplier shall package and label products in accordance with Cavli written requirements.

Planning of packaging including labelling:

Packaging shall contain and protect the product from damage and shall allow full transportation utilization. The packaging quantities must be in line with consumption presented by plants in region. Supplier will support to deliver smaller packing units for prototype and pre-series parts. Cavli will not accept any Minimum Order Quantity (MOQ) requested by Supplier beyond an agreed standard pack.

The planned type of packaging must be agreed with Cavli on the Supplier's initiative in sufficient time before PPAP or series production delivery. Any change of the packaging type or packing quantity should be communicated to Cavli and approved before it is changed in the system.

Material flow:

To avoid mix up of batches and to be able to trace batches, raw parts, parts purchased from sub-Suppliers and parts from Supplier's own production, "First In – First Out" principle shall be followed across all processes and delivery. Supplier shall ensure the traceability of their products from Cavli all the way back to their sub-Suppliers. For this purpose, the parts or containers shall be labelled in a suitable way with batch identification number and revision status. The revision status shall be stated on the delivery note.

7.30. Traceability

(IATF 16949: section 8.5.2.1)

The Supplier shall set up a defined process which allows the traceability of a single part, batch production, or at a maximum 8 hours of production all the way back to each production step and inspection lot across the entire supply chain, down to the raw material/purchased parts. The traceability plan must be agreed with Cavli on the Supplier's initiative and installed in sufficient time before PPAP submission. Cavli specific requirements for traceability must be taken into consideration.

7.31. Personnel

(IATF 16949: section 7.1.2/7.2)

Capacity requirements:

Personnel need to be planned in a timely manner for both the project and production. Planning shall be performed in such a way that sufficient capacity is available at the start of both project management and production.

Qualification:

When a new station is set up or in the case of a station change, the personnel shall be trained according to the new conditions. Corresponding verification shall be documented. When temporary/contracted personnel are deployed, a risk analysis shall be done up front in consideration of the workplace. These personnel shall be trained accordingly.

7.32. Station Release

(IATF 16949: section 8.3.5.2)

The Supplier shall release all manufacturing and assembly stations before PPAP. While doing so, the availability and suitability of the items listed in the following points shall be ensured:

- capability studies
- error simulation completed and documented (e.g. verification of automatic test equipment)
- complete and valid work documents (e.g. operation sheets, control plans, inspection plans, …)
- operating materials and maintenance plans
- inspection equipment
- means of transport
- provision of material with accompanying documents indicating the revision level of the parts.

The inspection shall be performed using a suitable checklist. All production and assembly operations shall be included. The deviations, if any, shall be documented. Responsibilities shall be defined for implementing corrective and improvement measures and target deadlines shall be set. After completing the defined measures, another inspection shall be performed, taking the deviations that had been previously identified into account. The results shall also be documented. A release for the PPAP can only take place once the results of the inspection are successful. This release shall be documented.

7.33. Manufacturing Prototypes

(IATF 16949: section 8.3.4.3)

General requirements for prototypes:

For prototype parts, a prototype inspection report (dimension, performance, process data, etc.) shall be submitted with the first delivery and in the event of modifications (index/item number). For this purpose, the initial sampling form VDA Volume 2 or AIAG PPAP shall be used in accordance with Cavli requirements. In this report, all drawing characteristics or the extent of the modification respectively, shall be verified on at least one part.

Apart from that, Cavli will specify the necessary extent of documentation in the individual case. If the prototype and production Suppliers are different, the prototype Supplier shall share with the production Supplier the process knowledge gathered in prototype fabrication, if contractually agreed. The process established to produce parts for validation shall not be changed without prior written agreement and acceptance by Cavli. Change requests shall comply with the requirements of change management according – Changes to Product or Process. Prototype deliveries shall also be marked and documented.

Location and component specific requirements for prototypes:
On request from Cavli, Special Characteristics and additional characteristics defined by Cavli are to be documented 100% during the prototype phase and in the ordered quantity. These characteristics are identified in the drawing. If requested by the Cavli receiving plant, the following additional requirements shall be fulfilled:

Proto 1: For each batch, all the Special Characteristics; shall be measured and documented for 15% of the delivered parts (round up quantity). In addition to the measured values, the respective average and range shall be indicated.

A deviation from this requirement is only possible under the following circumstances:
a) Characteristics are tool related; Production is taking place on series production machines and tools for which machine capability values are already available for similar parts (material, dimensions, and tolerances).

b) Parts coming from the series production: If this applies, all characteristics on two parts from each delivery have to be measured and documented. In this case, the respective average value and the range of

series production shall be reported. Measured values and other requested data (average value, range, capability values, and tool dependent characteristics) shall be documented.

Proto 2: For each prototype delivery, the documentation for Special Characteristics and further agreed upon characteristics shall be delivered for 5 parts. Quantities deviating from this are to be determined by the Cavli receiving plant. Measured values shall be documented.

7.34. Audit Planning

(IATF 16949: section 9.2/7.2.3/7.2.4)

The Supplier shall issue an audit program which defines the regular execution and the extent of internal product and process audits. VDA Volume 6 part 5 or VDA Volume 6 part 3 or equivalent procedures are to be applied. Audits at sub-Suppliers shall also be taken into consideration. Suppliers shall have qualified auditors to fulfil the automotive standards. Specific audit requirements related to special processes and products (CQI, Customer Specific Requirements, SPICE assessment, etc.) shall also be considered.
Note; if this expertise is not available within the Suppliers company, they should obtain such expertise through outsourcing from a suitably qualified contractor.

7.35. Internal Auditor Competency

(IATF 16949: section 7.2.3)

Supplier's internal auditors shall be qualified as recommended in ISO 19011 Guidelines for Auditing Management Systems. In addition, its internal auditors shall be competent in understanding applicable ISO 9001, IATF 16949, VDA 6.3, and AIAG requirements. At all times the current standard must be proven. The audit tool must be newly acquired, as Cavli only recognizes audits that have been performed with the current audit tool and by auditors that have completed the current training (including learning objectives check).

7.36. Capacity Verification (Run at Rate)

(IATF 16949: section 8.3.5.2)

A Run at Rate (R@R) is a performance driven trial run under serial production conditions. The purpose of R@R is to demonstrate that Cavli requirements for Supplier capacity are met, to provide evidence that the Supplier can produce the required volumes to specification with existing capacity and to identify potential process weaknesses. Potential reasons for performing R@R:

- Cavli requirement
- new product/ new Supplier
- changes in product, process or equipment
- capacity increase
- relocation of tool and/or equipment
- Supplier performance problems

Unless otherwise agreed, the R@R shall be applied to all production material supplied to Cavli. Catalogue parts are excluded from this R@R requirement. In case of any exception from performing a R@R, Supplier capacity for the respective parts shall then be assured and documented with a separate capacity commitment signed by the Supplier. The R@R shall be conducted either on all process steps or on individual bottleneck/critical process steps. When limited to individual process steps, the reason(s) shall be documented.

7.37. CQI/Qualification of Special Processes

(IATF 16949: section 9.2.2.3)

The AIAG (Automotive Industry Action Group) is publisher of the CQI guidelines (Continuous Quality Improvement). CQI formats are available at http://www.aiag.org/. For Suppliers and sub-Suppliers dealing with special processes according to AIAG, relevant CQI-guidelines shall be considered.
If the result shows findings of the type “Need for Immediate Action” or “Fail Findings”, the Supplier shall inform Cavli immediately and provide an action plan.

7.38. Maturity Level Assurance for New Parts

(IATF 16949: section 8.3.2.1)

For new parts, Cavli reserves the right to process the project in accordance with the requirements of VDA Volume Maturity Level Assurance (Product Creation – Maturity Level Assurance for New Parts). If this case applies, Cavli will contact the Supplier.

8. Production Part Approval Process (PPAP)

(IATF 16949: section 8.3.4.4)

Production Part Approval Process (PPAP) is based on either VDA Volume 2 (PPF) or on the production part release process of the AIAG PPAP. Cavli retains the right to specify one of these two procedures or a similar procedure. Prior to start of Production Part Approval Process (PPAP), it shall be ensured that all activities of process and quality planning have been completed.

8.1. Initial Samples

(IATF 16949: section 8.3.4.4)

Initial samples are products made and tested under series production conditions (plants, machinery, operating materials and test equipment, machining conditions). The test results on all characteristics must be documented within the initial sample report. The quantity of parts to be documented must be agreed upon with Cavli. The initial samples shall be submitted to the Cavli receiving plant by the agreed date and shall include the initial sample inspection report and documents according to the submission levels. Initial samples shall be clearly identified. To identify the characteristics, matching numbers shall be used in the initial sample inspection report and in the accompanying current drawing released by Cavli. For assemblies manufactured according to a Cavli design, including the single components, an initial sample inspection is obligatory and shall be presented to Cavli. For products based on the Supplier's own design, the Supplier shall sample and present the assembly to Cavli. Initial sampling shall also be performed for single components and, if necessary, for subassemblies. Cavli shall be allowed to review this documentation as required. Cavli reserves the right to issue a complaint at a later date about deviations from the Cavli specifications which have not been detected during the PPAP Approval Process.

8.2. Reasons for PPAP

(IATF 16949: section 8.3.4.4/8.5.6.1)

In alignment with above mentioned standards and regulations, the PPAP Approval Process is required if any of the following changes apply at the Supplier or sub-Supplier:

- if a product is ordered for the first time (marked on order)
- after the Supplier has changed a subcontractor
- for all affected characteristics after any product modification
- for all affected characteristics following a drawing index modification
- following an interruption in delivery after a stop shipment (business on hold)
- following an interruption in delivery of more than one year
- following an interruption in production of more than one year
- if production procedures/processes have been changed
- following the introduction of new/modified equipment
- following any type of relocation of PPAP approved production or the use of new or relocated machinery and/or operating materials
- after use of alternative materials and design changes in product.
- change in test/inspection method or new technique (no effect on acceptance criteria). For change in test method, Supplier should have evidence that the new method provides results equivalent to or better than the old (previous) method
- Production following upgrade, refurbishment, rearrangement of existing tooling or equipment, if requested by Cavli

Exceptions to approach and scope are only permissible in agreement with Cavli, for example in the following cases:

- interruption in delivery or production of more than one year
- small production batches, after-sales service parts
- standard and catalogue parts

Samples for PPAP are to be supplied to Cavli free of charge.

These need to be identified with "Cavli Engineering Samples Free of Charge" purple labels on the outside of each shipping box. The labels must also be attached on each order/worksheet to demonstrate the shipment are samples as distinct from production parts. If a purple label is not available it is permissible to use a purple paper sheet. Note, if the shipping box does not have the purple label with all required information the package could be placed on hold and/or scrapped and risk not getting to the intended Cavli recipient leading to request for additional samples at the Suppliers cost. If you need more details on this, please engage with your Cavli Supplier Quality or Engineering contact who will support.

8.3. Initial Sampling according to Data Modelling

(IATF 16949: section 8.3.5.1)

Measurements must be performed based on the valid data models, if applicable. The number of measuring points must be selected in a way that allows positive determination of all dimensions. Details of the measurement are to be agreed with Cavli. The characteristics identified and determined in section 2.7 – Product Description must be documented with the initial sample.

8.4. Assessment of Product and Process for Serial Production Release

The Supplier shall conduct a written self-assessment of product and process maturity for serial production using the VDA "Matrix for assessing the serial production maturity for product and process", if required.

8.5. Initial Sample Documentation

(IATF 16949: section 8.3.4.4)

The initial sample documentation according to the requested submission level (see section 3.3) shall be supplied at the same time as the initial samples. Cavli may require Suppliers to submit a validation package that contains additional documents and forms beyond those required by AIAG/VDA. Missing, incorrect, incomplete or delayed submission of initial sample documentation shall be recorded as a Supplier performance failure and will affect the Supplier's performance rating. Initial samples without complete documentation will not be processed and will lead to subsequent costs, which shall be charged to the Supplier.

8.6. Deviation in initial sample

(IATF 16949: section 8.3.4.4/8.7.1.1)

Documents, records, and initial sample parts may only be submitted if all specifications are fulfilled. In case of deviations, the Supplier shall first obtain written permission from Cavli. Initial samples with deviations that have no deviation approval will not be processed by Cavli. The following shall be submitted along with the deviation request:

- 8D report
- An action plan to return to planned serial conditions
- The planned point of time when normal production can be resumed

8.7. Material Data Reporting

(IATF 16949: section 8.3.4.4)

For all supplies to Cavli, material data needs to be provided where legal reporting obligations apply. Where PPAP requirements apply, Suppliers shall report material and substance information for all types of purchased materials, components or items supplied using the International Material Data System (IMDS) (www.mdsystem.com). Suppliers shall submit IMDS and, if required by Cavli, to Cavli as soon as possible upon award of new business, but in any case, prior to the PSW (Part Submission Warrant) or as part of the PPAP process. The Supplier IMDS/CAMDS information shall be subject to Cavli review and approval. Missing material data will lead to rejection.

8.8. PPAP Submission Process

(IATF 16949: section 8.3.4.4)

Suppliers of Cavalier wireless shall ensure that documentation and sample submission for PPAP are meeting the requirements of Automotive Industry Action Group (AIAG) PPAP Manual Level 3 (4th edition), If any document that cannot be prepared due to the type of production or transaction, the documents submission level can be changed after the department in charge of the company approves.

Requirement	Level 1	Level 2	Level 3	Level 4	Level 5
1. Design Record	R	S	S	*	R
- Proprietary components/details	R	R	R	*	R
- All other components/details	R	S	S	*	R

2. Engineering Change Documents, if any	R	S	S	*	R
3. Customer Engineering Approval, if required	R	R	S	*	R
4. Design FMEA	R	R	S	*	R
5. Process Flow Diagrams	R	R	S	*	R
6. Process FMEA	R	R	S	*	R
7. Control Plan	R	R	S	*	R
8. Measurement System Analysis Studies	R	R	S	*	R
9. Dimensional Results	R	S	S	*	R
10. Material, Performance Test Results	R	S	S	*	R
11. Initial Process Studies	R	R	S	*	R
12. Qualified Laboratory Documentation	R	S	S	*	R
13. Appearance Approval Report (AAR), if applicable	S	S	S	*	R
14. Sample Product	R	S	S	*	R
15. Master Sample	R	R	R	*	R
16. Checking Aids	R	R	R	*	R
17. Records of Compliance with Customer-Specific Requirements	R	R	S	*	R
18. Part Submission Warrant (PSW)	S	S	S	S	R

Legend:

- **S** = Submit to customer and retain at supplier
- **R** = Retain at supplier, available upon request
- ***** = Retain and submit upon customer request

8.9. Preventive action

FMEA must be prepared using the latest revision of the harmonized AIAG/VDA FMEA manual unless otherwise authorized by Cavli SQ. FMEA can be created for families of parts if batch processes and/or common tools are used. Families must be clearly defined and have a complete listing of part numbers. Family designations must be approved by Cavli Engineering and Cavli SQ. The Supplier must provide a copy of the family FMEA documents for review upon request by Cavli. If the document is deemed proprietary, the Supplier may provide the appropriate section or provide qualified technical assistance and submit the FMEA to Cavli requestor for review without retaining copies. A letter explaining the proprietary nature of the FMEA must be included in the PPAP submission package. Suppliers shall drive continuous improvement to reduce the severity and occurrence of all potential failure modes in accordance with the requirements of the AIAG/VDA FMEA Manual, latest edition.

8.10. Product and Process FMEA

(IATF 16949: Section 8.3.5.1 & 8.3.5.2)

FMEA shall be carried out to examine possible risk and their evaluation regarding severity, probability of occurrence, and the possibility of detection. These risks shall be minimized by introduction of appropriate measures satisfactory to Cavli. The FMEA shall be carried out in a timely manner, so that the result and measures to be taken can still be incorporated into planning. A FMEA shall be used for all phase of the product life cycle, such as design, production, assembly, packaging, transport, customer usage, as well as recycling and waste disposal. The FMEA shall be used as a continuous improvement tool.

9. Serial Production Requirements

9.1. Introduction

Once the manufacturing process is successfully validated (PPAP is approved), the serial production phase begins. During this stage, there are a number of requirements each Supplier and sub-Supplier shall be fully aware of and follow. Key areas for this phase are detailed in the following sections.

9.2. Processing Complaints

(IATF 16949: section 10.2.6)

Suppliers are expected to immediately notify all possibly impacted Cavli plants and other involved parties in the supply chain to Cavli, when made aware of a potential safety, quality or delivery issue. After a complaint is issued by Cavli, containment actions shall be implemented immediately. Containment status (D3 of 8D report) shall be reported to Cavli at the latest within one working day and updated periodically. An analysis of the root cause always needs to be carried out using suitable problem-solving methods and submitted to Cavli. Detailed analyses (such as Ishikawa, 3x5 why, error simulations …) are also to be carried out. When requested, these documents shall be submitted to Cavli.

The completed 8D report shall be submitted within 15 calendar days at the latest. If necessary, other target dates may be established in agreement between Supplier and Cavli. The 8D process can only be closed by the acceptance of Cavli.

Identification of certified parts or packaging after a complaint:

The clean point information shall be determined and communicated at once to the person in charge at Cavli. In addition, it shall be documented in the 8D-report. Subsequent deliveries from warehouse and work in progress which have been subjected to 100% inspection or testing due to complaint shall be marked or labelled. Every packaging unit shall be clearly labelled with the requested label or form until permanent corrective actions have been implemented successfully. The type of marking on the individual part needs to be agreed with the Cavli receiving plant, described on the requested "Certified Parts" label or form, and included on the 8D Report.

Cavli retains ownership rights of all material returned for analysis. If destructive testing is required to determine root causes, Cavli shall be notified prior to the testing process. The destruction of any part returned for analysis without written permission from Cavli is strictly forbidden. Material associated with a complaint, wherein responsibility of failure is indeterminate or disputed, shall be returned to Cavli for retention unless otherwise agreed in writing.

9.2.1. Measurement and Improvement of Supplier Quality Performance:

It is the expectation of Cavli that Suppliers will achieve and maintain zero defects and 100% on time delivery. Cavli continuously monitors the performance of their supply base using key performance indicators (KPI's) designed to evaluate launch performance, delivery performance, complaint and warranty performance, and serial production quality performance. Cavli monitors and evaluates these KPI's in order to:

- Permit and enable Supplier performance comparisons
- Derive necessary strategies and initiatives for Supplier development activities
- Continuously improve Supplier quality performance.

The Supplier's performance status is taken into consideration for future sourcing decisions as well as for identifying areas to focus continuous improvement efforts.

9.2.2. Customer Satisfaction:

Supplier shall establish processes and designs to achieve zero defects, 100% on-time delivery, and green quality and shipping scorecards. This applies to both quality, delivery and all logistics issues.

Cavli monitors Supplier quality and shipping performance and drives corrective actions for improvements through Supplier Scorecards. Supplier shall review and verify monthly updates and ensure action plans are developed to achieve green quality and shipping scorecards.

9.2.3. Supplier Quality Scorecard

Cavli shall maintain a Supplier Quality Scorecard to evaluate and monitor supplier quality performance on both a monthly and rolling twelve-month basis. The scorecard shall provide an objective assessment of supplier performance and shall support sourcing decisions, supplier development activities, risk mitigation planning, continuous improvement initiatives, and supplier recognition programs.

The Supplier Quality Scorecard shall be updated monthly and shall be based on supplier performance related to product quality, delivery performance, responsiveness, customer impact, and containment activities.

9.2.4. Quality Score Calculation

The Supplier Quality Score shall be calculated using the criteria and point allocation defined below:

Quality Score Formula					
Measure Group	**Possible Points**	**Points Distribution**			
***Nonconforming** (Lots)*	25	0 = 25 points	1 to 24 = 20 points	25 to 49 = 10 points	50 or more = 0 points
***Number of Problem Cases** (Quality / Packaging)*	10	0 = 10 points	1 to 2 = 5 points		3 or more = 0 points
Delivery delay	10	0 = 10 points	1 to 2 = 5 points		3 or more = 0 points
***Repeat Problems** (Quality)*	15	0 = 15 points	1 or more = 0 points		
***Customer Impacted** (Quality / Shipping Delay)*	25	0 = 25 points	1 or more = 0 points		
***Number of Problem Cases** (Warranty)*	5	0 = 5 points	1 or more = 0 points		
***CS Days** (CS1 + CS2)*	5	0 = 5 points	1 or more = 0 points		
***Number Late Responses** (Quality)*	5	0 = 5 points	1 or more = 0 points		
Spills		*More than 0 forces score to: 50 points.*			
Score Color Indicators		**RED** for scores Less than 80	**YELLOW** for scores Equal to or greater than 80 Less than 90		**GREEN** for scores Equal to or greater Than 90

The maximum achievable score shall be 100 points.

Both the monthly score and rolling twelve-month score shall be considered when evaluating supplier performance and sourcing eligibility.

9.2.5. Scorecard Usage to Drive Improvement:

If Supplier's scorecard has a red indicator(s), quality score(s), or shipping score(s), Supplier shall establish aggressive action plans to drive improvement to green. If Supplier's scorecard has a yellow quality score(s) or shipping score(s), Supplier shall develop and implement action plans to drive improvement to green. If Supplier is on Controlled Shipping Level 2, on New Business Hold, or has a twelve (12) month red average on its quality or shipping scorecard, Supplier shall expedite appropriate corrective action steps.

NOTE: Supplier shall notify its Registrar in writing within five (5) calendar days of being placed on Controlled Shipping Level 2 and/or New Business Hold.

9.2.6. Escalation Requirements for Repeated Red Ratings

Repeated Red classifications shall trigger escalating supplier management actions. Cavli Supplier Quality Development (SQD) shall implement the actions defined in table below:

Red Score Escalation Requirements :

Status	SQD Action
Monthly Score Rated Red	Cavli SQD shall conduct a face-to-face review with relevant Cavli stakeholders and the supplier's key representatives (e.g., Quality Manager, Plant Manager) at the beginning of the following month. The review shall evaluate root causes, corrective actions, recovery plans, and the effectiveness of actions implemented to improve scorecard performance.
Score Rated Red for Two Consecutive Quarters	Cavli SQD shall evaluate the supplier for inclusion in a structured Supplier Improvement Program (SIP). Cavli SQD shall review the supplier's continued performance concerns with Engineering, Operations, and Purchasing stakeholders and shall initiate alternative sourcing assessments where appropriate.
Score Rated Red for Three Consecutive Quarters	Cavli SQD shall assess the supplier for placement on New Business Hold (NBH). Where justified based on business risk and performance history, New Business Hold status shall be implemented. Removal from NBH shall only be considered after the supplier achieves Green Quality Scorecard ratings for two consecutive quarters and demonstrates sustainable performance improvement.
Quarterly Score Remains Red After New Business Hold	Cavli SQD, in conjunction with Engineering, Operations, Supply Chain, and Purchasing stakeholders, shall review and execute a business continuity and resourcing strategy.

	Actions may include business redistribution, dual sourcing, tooling transfer, or complete supplier phase-out, as appropriate to mitigate risk to Cavli and its customers.

9.3. Warranty management systems / Customer complaints and Field Failure test analysis

(IATF 16949: section 10.2.5 and 10.2.6)

For complaints from the field, the Supplier must plan a methodical analysis according to the VDA volume "Joint Quality Management in the Supply Chain - Marketing and Services - Field Failure Analysis" or other customer specifications. If the SQE and the Supplier are not familiar with VDA Field Failure Analysis Process Audit Questions Software version 1.8.9, then, they need to work together to agree an acceptable level of analysis to IATF 16949 standard. The No Trouble Found process is part of the procedure.

9.4. Layout Inspection and Functional Testing/Annual Requalification

(IATF 16949: section 8.6.2)

Supplier shall annually perform a layout inspection and functional verification to all engineering material and performance requirements. These must be available to Cavli on request. If discrepancies are found, Supplier shall contact Cavli SQ for resolution. Supplier shall submit corrective action and communication of the updated inspection and verification to Cavli SQ for approval. All products shall be subjected to an annual layout inspection and functional testing (Requalification), unless agreed otherwise with Cavli. After previous agreement with Cavli, for parts that are similar for Cavli, the requalification can be carried out per product group (“Family”) or results for the current series production tests can be included, for example:

- Cyclical series production releases
- Product audits (aggregates, modules, components, parts, etc.)
- Records for initial item and final item tests
- SPC evaluations
- Initial sampling
- Incoming goods inspection

The valid Cavli specifications are the basis for requalification/Requalification. A layout inspection and functional testing usually cover:

- Dimension
- Material
- Function

Other test items are to be agreed with the Cavli receiving plant. The layout inspection and functional testing/annual Requalification shall be planned and presented with the Cavli initial sample inspection and shall be included in the Control Plan. The results shall be documented and made available for evaluation by Cavli. For this purpose, the Initial Sample Inspection Report forms from VDA Vol. 2 (PPF) or PPAP (PSW) from AIAG shall be used. If the test results are negative, the Supplier shall immediately contact Cavli. The risk for Cavli, the cause of the fault, and actions shall be specified. The results of the layout inspection shall be submitted to Cavli upon request.

9.5. Control of Non-Conforming Product

Supplier shall have an internal containment procedure that integrates the requirements of the IATF requirements.

9.6. Control of reworked and repaired product

The Supplier shall utilize risk analysis (such as FMEA) methodology to assess risks in the rework and repair process prior to a decision to rework and repair the product. The Supplier shall obtain approval from Cavli prior to commencing rework or repair of the product. It is prohibited to launch rework or repair process without Cavli authorization. Process of the rework or repair product should follow IATF 8.7 requirements.

9.7. Safe Launch

Introduction:

Safe Launch planning is designed to protect both Cavli and the Supplier during the initial phases of product supply. A Safe Launch process shall be implemented to detect symptoms of potential issues in new processes and to ensure that new launches are defect free. To accomplish this, a Safe Launch Plan shall be agreed during the planning phase. During Safe Launch, an increased frequency of inspection and monitoring shall be performed on designated and other agreed characteristics.

Team:

The Supplier nominates an empowered interdisciplinary team with defined responsibilities to ensure the conformity of the parts and to analyses and eliminate internal rejects in a timely manner.

Duration:

In general, the Safe Launch phase starts with the PPAP submission and extends until start of production (SOP of the Cavli customer) + 90 days, unless otherwise specified by Cavli. The program duration may also be specified by a quantity of product.

Exit and Restart Criteria: Zero defect supplies during the entire Safe Launch phase and fulfilment of all agreed criteria qualify the Supplier for an exit out of the Safe Launch phase. Any defect discovered during the Safe Launch Phase resets the event to "0" and the Safe Launch Phase is restarted.

Documentation:

Record measurements, inspection raw data and capability charts shall be submitted on agreed frequency to Cavli.

In case of deviations from the specification, the following forms shall be used and submitted to Cavli in order to obtain release prior to delivery:

- 8D Report Form

The submitted information shall indicate when the Supplier plans to return to normal production. All deliveries based on a deviation approval shall have additional identification labels on all load carriers.

Contingency Plan:

Supplier must review annually, and have available on request of Cavli, potential risks that may disrupt its production and/or shipments. Supplier must have a Contingency Plan with respect to those risk events. Risks include, but are not limited to:

- Natural disasters – flood, windstorm, earthquake, etc.
- Localized events – fires, explosion, terror threats, utility disruption, etc.
- Raw material issues

- Sub-Supplier issues
- Labour issues – strike, illness, training, security, human resource policies, etc.
- Information Technology (IT) issues – data security/recovery, systems, cyber-security, etc.
- Regulatory or compliance issues
- Pandemics

Supplier's Business Contingency Plan process must define preventative measures, immediate responses, recovery steps, and timing to resume production of a quality product. Robust plans shall include:

- Defined roles and responsibilities
- Response organization and contact information
- Initial actions
- Escalation procedures
- Communication Plans
- Recovery Plans

Measurement System Analysis:

Supplier shall perform a gauge study on each gauge used for checking a Special Characteristic (significant, critical, or Supplier identified) in accordance with the methods and timing described in the latest AIAG Measurement Organizations Analysis (MSA) manual and/or VDA 5 Capability of Measurement Processes, Capability of Measuring Systems manual as applicable to determine measurement system capability. Supplier shall have a containment plan for gauges that do not meet the MSA specification (such as 100% inspection, gauge improvement, etc.). Supplier shall maintain gauge study records. The above requirements apply to all measurement systems referenced in the control plans

OEM Customer Specific Requirements

(IATF 16949: section 4.3.2)

In addition to the aforementioned Cavli Customer Specific Requirements documented and referenced in this document, it is the Supplier's responsibility to ensure that they are at all times compliant with relevant Original Equipment Manufacturers (OEM) Customer Specific Requirements and standards irrespective of how they are relayed in the Supply Chain. OEM CSR's are to be found on our Customer's websites and can also be found on the IATF website at this link;

https://www.iatfglobaloversight.org/oem-requirements/customer-specific-requirements/

Raw material Suppliers and software Suppliers are required to comply with the CSR. Cavli will request certificates as part of our registration process and on an ongoing basis to ensure certificates remain valid.

10. Cavalier Wireless Property Handling

Supplier shall exercise care with property belonging to Cavalier Wireless while it is under the supplier's control or being used by the supplier. The supplier shall identify, verify, protect and safeguard Cavalier Wireless property provided for use or incorporation into the products and services.

When the Cavalier Wireless property is lost, damaged or otherwise found to be unsuitable for use, the supplier shall report this to Cavalier Wireless and retain documented information on what has occurred. Cavalier Wireless property can include materials, components, tools and equipment, premises, intellectual property and personnel data. Cavalier Wireless authorized person shall do physical onsite asset verification at regular frequency.

Suppliers are expected to provide the necessary evidence during asset verification like photo, history card, life expectancy, damages if any etc.

In case of any breakdown / damage or end of tool life in the Cavalier Wireless Assets, Supplier shall reach out to respective Cavalier Wireless SQA for resolution. Cavalier Wireless owned property shall be identified with the following information:

1. Property of Cavalier Wireless
2. Tool Number /Asset Number - Assigned by Cavalier Wireless
3. Part Number
4. Part Name

11. Audits and Access

(IATF 16949: section 8.4.2.4.1)

Cavalier Wireless & Its Customers reserves the right to audit supplier facilities with prior notice. Suppliers must provide access to relevant areas, personnel, and documentation. In addition to audits conducted by Cavalier Wireless, suppliers shall conduct internal audits of their production processes. Records of any findings from internal audits and actions taken in response to findings should be available for review during the Cavalier Wireless process audit or product audit.

12. Cavalier Wireless Specific Compliance Requirements

12.1. AECQ

(IATF 16949: section 8.3.4.2/8.5.6.1)

Suppliers who develop and/or produce, assemble or test electronic components shall at a minimum fulfil the respective qualification standard from the Automotive Electronics Council (AEC; e.g. AECQ 100; AECQ 101; AECQ 200). http://www.aecouncil.com/AECDocuments.html Exceptions or deviations to above, shall be communicated to and agreed with Cavli.

12.2. Robustness Validation

(IATF 16949: section 8.3.4.2/8.5.6.1)

The Supplier shall provide their approach to robustness validation in the development phase. In addition, the procedure of robustness validation shall be made available to Cavli for review and approval. For further information, refer to ZVEI – Handbook of Robustness Validation.

12.3. Mission Profile for Electronic Components

(IATF 16949: section 8.2.3.1/8.3.4.2/8.5.6.1)

Upon award of business, Cavli may issue a series of work documents to be taken into account by the Supplier:

- Statement of Work (SOW) and/or
- Semiconductor Group Standard

The Semiconductor Group Standard shall be provided by Cavli along with the RFQ. It shall be followed during the development phase, where the Supplier and Cavli shall mutually share all relevant details required as per the APQP process concerning:

- the Semiconductor Fabrication Process
- the Wafer Probe Process
- the Assembly Manufacturing Process
- the Assembly Test Process

12.4. Product Change Notification (PCN) and Supplier Change Request (SCR) for Electronic Components

(IATF 16949: section 8.5.6)

Suppliers who develop and/or produce, assemble or test electronic components shall inform Cavli about changes affecting product and/or process. Details of change shall be submitted to Cavli via the requested form and comply with the requirements of PCN/SCR described in the current version of the European Standard (ZVEI) and/or in further valid standards. The Supplier remains responsible for all changes, irrespective of ZVEI notification requirements. For change classification, Cavli requires a formal delta (change) FMEA/risk assessment associated with the change. The Supplier shall include a completed ZVEI Delta Qualification Matrix (DeQuMa) PCN Delta-Qualification-Matrix currently, Rev. 3.1, with all requests for change. The Supplier shall always follow the latest revision. This document is available on the ZVEI website. Additionally, Cavli may deem further testing necessary prior to accepting the change. Cavli may request a data review of the critical parameters for the process or processes affected by the change. This should be in the form of a comparison of new process against existing process. For initial release and changes related to software during the full product lifecycle (development, launch, production, aftermarket) the Supplier shall adhere to the specific software release process of Cavli. This shall include management and verification of software revisions and requires approval by Cavli.

12.5. Functional Safety of Software and Components with Integrated Software

(IATF 16949: section 8.3.2.3)

Suppliers who develop or supply software or electronic components with integrated software shall meet the requirements from Automotive SPICE or an equivalent standard. Unless otherwise agreed, the technological maturity level 2 or higher needs to be fulfilled according to the VDA Volume “Automotive SPICE Process Assessment Model” for processes, which are part of the “VDA process scope”. Cavli retains the right to carry out an assessment at the Supplier’s location.

If maturity level 2 currently cannot be achieved, the Supplier shall provide an action plan including an adequate time schedule to achieve maturity level 2. When safety-relevant electronics and software are included in the scope of supply, then the development process shall be "state-of-the-art" and comply with IEC DIN EN 61508, ISO 26262. Safety-relevant parts, their documentation and the drawings shall be marked as such so that they can be clearly identified throughout the development phase and series production process. The requirements of the necessary safety level (e.g. SIL, ASIL …) are specified in the respective specification. The safety concept with design and implementation specifications shall be agreed with Cavli.

12.6. Cybersecurity

12.6.1. Enterprise Cybersecurity Requirements

Supplier must protect Cavli data from unauthorized use, access, modification, processing, or disclosure. Supplier shall implement a comprehensive Information Security Program to establish effective administrative, technical and physical safeguards to minimize risk to Cavli users, assets and data and to identify, protect, detect, respond, and recover from cyber threats, security incidents, and breaches. The Information Security Program shall be documented in written policies, procedures, and standards, and shall, at a minimum comply with Cavli requirements and shall be reviewed annually.
Supplier will maintain a formalized process to align the Information Security Program with industry standards and frameworks (e.g., TISAX, ISO27001, ISO27017, ISO27034, NIST 800-53 r5 or greater, OWASP Top10 for Web/Mobile) for maintaining appropriate cybersecurity within their organization, thus minimizing cybersecurity risk that could affect Cavli and its business operation.

Supplier shall notify Cavli within 24 hours of a: (i) security incident, (ii) unauthorized use or disclosure of Cavli data, (iii) or a breach; that directly or indirectly poses a risk to Cavli by sending an email to respective buyer or POC at Cavli.

12.7. Data Privacy and Protection Requirements

The Supplier must process any personal information which we provide with the highest standards of security and confidentiality, strictly in accordance with the all-applicable Data Protection Law and Regulation, including General Data Protection Regulation (GDPR) (EU) 2016/679.

Cavli will require that the parties implement the relevant Data Protection contract exhibit, including all required Privacy, Security, and Cross Border Transfer Impact Assessments.

The Supplier must process personal data in accordance with the Data Protection principles.
If you process data, you have to do so according to the following Data Protection and accountability principles:

- Lawfulness, fairness and transparency — Processing must be lawful, fair, and transparent to the data subject.
- Purpose limitation — You must process data for the legitimate purposes specified explicitly to the data subject when you collected it.
- Data minimization — You should collect and process only as much data as absolutely necessary for the purposes specified.
- Accuracy — You must keep personal data accurate and up to date.
- Storage limitation — You may only store personally identifying data for as long as necessary for the specified purpose.
- Integrity and confidentiality — Processing must be done in such a way as to ensure appropriate security, integrity, and confidentiality (e.g. by using encryption).
- Accountability — The data controller is responsible for being able to demonstrate compliance with all of these principles.

<u>Privacy Minimum Requirements:</u>

The Supplier must demonstrate that they implement best practices including at minimum:

1. Data Privacy Policies and Processes
2. Minimum Data Collection
3. Maintain Transparency
4. Data Inventory – Record of Processing Activity
5. Privacy by Design
6. Training and Awareness
7. Privacy Risk Management (including DPIAs where required)
8. Incident Management Processes

9. Data Subject Rights Management
10. Cross Border Data Transfer Impact Assessment and Management. (CCBP)

13. Responsible & Ethical Procurement

13.1. Code of Conduct for Business Partners (CCBP)

(Note: Not including drive line as listed in CCBP)

As a global technology company enabling the safer, greener and more connected future of mobility, it's part of Cavli's values to act responsibly, to always do the right thing, the right way. These values also apply to all of our partners. Over the years, Cavli has developed strong relationships with its partners, and as we continue to strive to deliver better products for our customers, we expect our partners to follow Cavli's principles. The principles contained in the Cavli Code of Conduct for Business Partners are essential to ensure that all of Cavli's partnerships are ethical, compliant and trustworthy. As we face global challenges, it's critical that every Cavli Business Partner understand and agree with the principles set out in this Code. We expect that our Business Partners will flow these principles and expectations to their Suppliers and business partners so we can ensure responsible and ethical sourcing throughout our full Supply Chain. Cavli reserves the right to require our Business Partners to ensure sub-tier Suppliers are compliant to local, national and international laws and adhere to Cavli's Code of Conduct for Business Partners. Evidence of effectiveness shall be based on having and implementing a defined process including measurement and monitoring.

13.1.1. Responsible Sourcing – Minerals

(Dodd-Frank - 2010 United States legislation, Dodd-Frank Wall Street Reform and Consumer Protection Act, Section 1502; OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas)

All Suppliers whose products are likely to contain conflict minerals and other minerals (potentially relevant Suppliers) shall comply with responsible sourcing of raw materials and applicable regulations as stated in Cavli Conflict Minerals policy and Supplier Code of Conduct. Cavli requires its potentially relevant direct material Suppliers to provide reports to Cavli (when requested but at least annually) stating all the smelter

or refiners identified in the supply chain of products to Cavli. The report templates shall comply with the latest CMRT and EMRT versions posted on the RMI website. In addition, Suppliers shall support the Cavli commitment to identify, reduce and, where possible, eliminate any non-conformant sources of the minerals from Cavli products.

14. Cavalier Wireless Process Specific Requirement

14.1. Incoming Material Inspection

Supplier should ensure there is no warpage or oxidation and should also ensure the conformity of the product according to IPC-A-610, Class 3.

Raw Material- Sampling plan should be as per ISO 2859-1/ANSI/ASQ Z1.4. AQL 1.0

Incoming Inspection Report should be maintained and should be submitted whenever requested.

IQC report should contain:

- Date of inspection
- Inspector name or ID
- Supplier name
- Supplier code or ID
- Purchase Order (PO) number
- Invoice number
- Part name and part number
- Lot number / batch number
- Date code (DC) of material
- Received date
- Quantity received along with packing type and count (Reel/Tray/Tube)
- Observation (Visual/Dimensional/Functional)
- Disposition Status

14.2. Baking

Supplier should follow the baking procedure as per J-STD-033 for all MSD. For module PCB's supplier perform baking maintain the baking temperature of 100°C ±5°C for 2 Hour

(+15/-0) minutes irrespective of shelf life or Packing condition.

14.3. Solder Paste Preparation

Supplier should maintain documents related to solder paste and thawing. The acceptable Solder Paste is RoHS SAC 305, Type 4 / Type 5 (Preferred Alpha CVP390)

14.4. Solder Paste Printing

Supplier should set the cleaning frequency of stencil for each panel and should ensure solder paste deposition is consistent.

14.5. SPI (Solder Paste Inspection)

Supplier should ensure the tolerance for printing height is +/-1 mil, MSA study and SPC should be performed and Cpk should be maintained at 1.67.

14.6. Component Placement (SMT)

Supplier should ensure the Component & frame placement is proper, no squeeze or lift is allowed and same should be verified at pre-reflow. Ensure NO component throw/missing during operations. Component grouping should be as lead height part to be mounted First & Gradual increase in part thickness placement. This is to ensure no mounted component is disturbed while placement of adjacent parts. Below is the acceptable stock variance for components recommended for Seamless Production Planning.

- A+ (Qualcomm chips, Memory ICs, eSIMs) = 0%
- A (Other active items) = <0.5%
- B (Switches and connectors) = <1%
- C (Passives) = <3%

14.7. Reflow Soldering

Supplier should maintain PWI (Process Window Index) at or above 80%. Recommended to use at least eight zones reflow soldering equipment. Recommended Reflow Profile temperature is 235~245 °C, (cannot exceed 260 °C). Cooling rate should be -4°C/s. To avoid PCB rejection, Pre-reflow inspection to be done to ensure NO components are disturbed & frame is not bent or Lift-up.

14.8. AOI (Automated Optical Inspection)

Acceptance as per IPC-A-610, Class 3. 100% coverage should be available for all component except those are under the frame. Do manual inspection for the 5 panels in every hour internal, especially under the frame component. Supplier should maintain AOI inspection report of defective boards for every batch and record should be accessible up to 5-7 years. MSA study and SPC should be performed and Cpk should be maintained at 1.67. AOI report should be shared with Cavalier wireless after completion of each work order.

14.9. X-Ray Inspection

First Part Approval (min 3 panels) should include X-Ray inspection and inspection should be carried out as per IPC-A-610 class 3. 10% of PCB panels as per productivity should undergo inspection for every 1 hour. Equipment: - MSA study and SPC should be performed and Cpk should be maintained at 1.67. For the Proto, 100% X-ray inspection should done for all boards. X-ray report should be shared with Cavalier wireless after completion of each work order.

14.10. Canning Process

Supplier should ensure the polarity of the module while performing the Canning operation. Orientation and alignment issues are not allowed.

14.11. Depaneling / Routing

While Depaneling / Routing, Undercut and Overcut or any other damages are not acceptable and it will be considered as Scrap. PCB layer delamination due to stress during Routing and burr removal is not acceptable. Don’t use FILES for removal of burr. Deep scratches on the CAN edges are NOT Acceptable. Acceptable Excess +0.1~0.15mm unless specified explicitly.

14.12. Testing

First Panel should undergo Testing & Validation (Flashing & Calibration). Mass Production should start only after the approval of Cavalier Wireless (Email) confirmation to be followed & keep record.

Acknowledgment

(Please print this page, complete and signoff with company seal in the following information. Email a pdf file of only this page to Cavli Buyer & SQE)

I hereby confirm that I have received the latest edition of the Cavalier Wireless Supplier Quality Assurance (SQA) Manual dated _____.

I acknowledge that the requirements specified in this manual have been reviewed and understood by the appropriate personnel within our organization. We commit to implementing and maintaining these requirements throughout our organization and, where applicable, within our sub-supplier network.

We understand that compliance with the requirements of the SQA Manual is a condition of doing business with Cavalier Wireless and may be evaluated through audits, assessments, performance reviews, and other verification activities conducted by Cavalier Wireless or its customers.

By signing below, we confirm our commitment to comply with the requirements contained in this manual and to support their effective implementation.

Supplier Parent Company Name: (print)

Company Representative Signature:

Company Representative Name: (print)

Date: (print)

(Company Seal)