Corporate Quality Manual

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1. Quality Management System (QMS) Overview

1.1. QMS Process & Sequence

Semtech Corporation determined the need for fifteen core quality management system processes that are applicable throughout the corporation:

- Customer Focus
- Semtech's Leadership Team Responsibilities
- Management Review
- Most Important Tasks (MITs)
- Resource Management
- New Product Introduction
- Managing Customer Contracts
- Documentation & Key Datafile Management
- Supplier Management
- Purchasing
- Managing Non-Conforming Material
- Manufacturing & Operation Controls
- Measurement, Analysis & Improvement
- Corrective Action Request System
- Preventive Action

The sequence and interaction of these processes are described in appendix D. Appendix D: QMS Sequence & Interaction.

The processes identified and detailed within this manual all utilize the same elements in determining risk assessment methodology of input, actions and outputs. Refer to Appendix F. Appendix F: Elements of a Single Process.

Semtech Corporation's Quality Management System ensures that:

a. The entire organization focuses on customer requirements (both internal and external) and that business processes are in place to enable these requirements to be fulfilled;
b. The criteria and methods needed to ensure that both the operation and monitoring of these processes are effective;
c. The Quality Management System complies with the requirements of ISO 9001, where applicable IATF 16949 and other appropriate QMS standards;
d. Resources and information necessary to support the operation and monitoring of these processes are available;
e. Product quality, product reliability, and business practices meets or exceeds the quality, reliability and performance requirements demanded by ourselves and our customers;
f. Quality objectives are set and are consistent with our quality policies;
g. Methods exist to monitor, measure and analyze these processes; and,
h. Actions are taken to achieve planned results and continual improvement of these processes.

1.2. Quality Management System Policies

The following QMS policies are applicable throughout the company:

- Individuals engaged in the review and/or approval of QMS processes implemented through Oracle Agile PLM (PLM) shall be provided a unique electronic address by Semtech's I.T. group.
- The unique electronic address stamp assigned during the course of review or approval for QMS processes implemented through PLM application is equivalent to handwritten approval.
- As defined within this Quality Manual, Semtech Corporation continues to meet the documentation requirements established in ISO 9001 and where applicable IATF 16949 standards to include;
- A quality manual, and quality policy
- Quality objectives established through our MITs program
- Documented procedures and records required by ISO 9001 & IATF 16949 and other regulatory standards or statutes.
- Documents and records necessary to demonstrate the effective planning, operations and control of our processes

1.3. Scope of Management Systems

Semtech Corporation is a global manufacturing company empowering a network of design, manufacturing and test facilities. As these facilities develop and execute their management systems their scope may vary slightly, but the overall intent is to execute pursuant to Semtech's goals and requirements, relevant industry standards, while meeting customer requirements and expectations.

1.3.1 Semtech HQ

The Design, Development of Protection Product, Management of Manufacturing and Engineering Processes, the Marketing and Sales of Commercial,

Military and Industrial Semiconductor Components, Modules, Assemblies and Associated Products.

1.3.2 Semtech Neuchatel

The Design, Development, Manufacture, Production, and Test of Commercial and Industrial Semiconductor Components, Modules, Assemblies and Associated Products.

1.3.3 Semtech Reynosa

The Design, Manufacture, Test of Commercial, Industrial, Military Semiconductor Components, Modules, Assemblies and Associated Products.

1.3.4 Semtech San Jose, Semtech Morrisville, Semtech San Diego, Semtech Plano:

The Design of Commercial, Industrial Semiconductor Components and Associated Products.

1.3.5 Semtech Irvine

Manufacturing and Operations control of silicon integrated circuits and associated higher level products for video, optical, and data communication markets, and supporting activities for Design and Development.

1.3.6 Semtech Burlington

The Design and Development, Manufacturing and Operations control of silicon integrated circuits and associated higher level products for video, optical, and data communication markets.

1.3.7 Semtech Kanata, Semtech Bristol, Semtech Stansted UK:

The Design and Development of silicon integrated circuits and associated higher level products for video, optical, and data communication markets.

1.4 Quality Manual Policies

Quality & Reliability group (Q&R) maintains this document as the Corporate Quality Manual. This corporate quality manual:

a. Specifies Semtech's Core Values
b. Specifies the corporate Quality Policy.
c. Specifies and describes the core quality management system processes and their sub-processes.
d. References lower level documents that are implemented company-wide.
e. Provides guidance and policies for processes or sub-processes that may be implemented or customized at specified company sites.
f. Specifies which company site is required to have a supplemental quality manual.
g. Specifies which quality system processes are applicable at each company site.

Semtech sites may require quality manual supplements when QMS processes deviate or need to be clarified to ensure effective local implementation. The Executive Vice President of Q&R determines which sites are required to have quality manual supplements to this Corporate Quality Manual. The sites requiring a quality manual supplement are defined in; 24. Appendix A: Semtech Sites Requiring Quality Manual Supplements. The local site Quality Manager also serves as the site ISO Management representative who is responsible to prepare and maintain the quality manual supplement.

Semtech maintains certain quality management system documents that are applicable companywide within PLM Document Management System.

Additions or exceptions to the corporate procedures are maintained at local sites. Corporate quality Management must review, approve or reject exceptions to corporate quality procedures.

Since Semtech Corporation is a company of many sites, some sites may only be required to implement and maintain a subset of QMS processes and/or their sub-processes. The Executive Vice President of Q&R determines which QMS processes and/or sub-processes are required for each Semtech site.

The QMS requirements for each site are specified in 25. Appendix B: Site Application of QMS Process.

The site ISO Management Rep ensures that the combination of corporate procedures and site procedures address all applicable quality management system requirements.

1.5 Control of Documents

Semtech Corporation maintains a documented procedure identifying and controlling the use of its production documents. Semtech Corporation also maintains a documented process for enabling revision control and approval routings within our QMS. All electronically controlled documents are retrievable and readable with access down to points of use.

1.6 Hierarchy of Documents

Unless otherwise specifically agreed to or approved by the Corporate Quality Manager, in the event of any conflict between the provisions of this manual, forms, guidelines or requirements, the order of precedence is as follows: (i) the referenced process procedure and any Addendum or any Appendices thereto; (ii) and then Semtech Corporate Quality Manual (iii) any applicable approved customer requirement contract or agreement (iiii) as applicable the ISO, AS, TS, or OHSAS standard.

1.7 Adjunct Procedure or Specification

The procedures and specifications referenced throughout this Quality Manual typically require no adjunct procedure or specification. If a local site has an established process or procedure exceeding, not circumventing, the guidelines and requirements of the referenced procedure then such an adjunct procedure maybe authorized keeping the guidelines below in mind.

Exception to this procedure or specification at the local site level requires a local adjunct procedure outlining the exception, approved and controlled within PLM document management system and approved by both the site Quality Manager and the Corporate Quality Manager. Furthermore, an exception clause must be inserted in their applicable local Supplemental Quality Manual.

When an exception is documented and approved, the Supplemental Quality Manual shall be identified within the Relationship tab of the relevant local adjunct procedure.

1.8 Undated Documents

User must verify current or applicable revision level within PLM Document Management System prior to use.

1.9 External Reference Documents

1.9.1 ISO 9001

1.9.2 AS 9100

1.9.3 ISO 14001

1.9.4 IATF16949

1.9.5 OHSAS 18001

1.10 Internal Reference Documents

Related Documents as identified throughout this quality manual are applicable to the extent noted herein.

1.11 Control of Quality Records

Semtech Corporation defines quality records as records that provide evidence of conformity to requirements and of the effective operation of the QMS.

Semtech Corporation maintains a documented procedure and controls required for the identification, storage, protection, retrieval, retention and disposition of such records. Semtech's quality records are legible, readily identifiable and retrievable.

1.12 Definitions (Terms, Acronyms, and Abbreviations)

The terms and acronyms identified below are typical in their use within Semtech's quality management system and not solely for the use within this document.

1.12.1 PLM: Product Lifecycle Management

1.12.2 CEO: Chief Executive Officer

1.12.3 QAM: Quality Assurance Manager

1.12.4 Q&R: Quality and Reliability

1.12.5 APQP: Advanced Product Quality Planning

1.12.6 PPAP: Production Part Approval Process

1.12.7 CAPA: Corrective Action Preventive Action

1.12.8 CAR: Corrective Action Request

1.12.9 PAR: Preventive Action Request

1.12.10 SCAR: Supplier Corrective Action Request

1.12.11 NA: Not Applicable

1.12.12 NS: Not Scored

1.12.13 QC: Quality Control

1.12.14 HR: Human Resources

1.12.15 LMS: Learning Management System

1.12.16 OFI: Opportunity for Improvement

1.12.17 ORT: On-going Reliability Testing

1.12.18 CR: Customer Request

1.12.19 ECO: Engineering Change Order

1.12.20 MCO: Manufacturing Change Order

1.12.21 AVL: Approved Vendor List

1.12.22 QMS: Quality Management System

1.12.23 CCare: Customer Care Action Request

1.12.24 SFDC: Sales Force Dot Com

1.12.25 ERP: Enterprise Resource Planning

1.12.26 SAP: Systems Applications and Products (in Data Processing)

1.12.27 SAR: Supplier Action Request

1.12.28 CMRT: Conflict Mineral Reporting Template

1.12.29 CF: Counterfeit / Fraudulent

1.12.30 OCM: Original Contract Manufacturer

1.12.31 OEM: Original Equipment Manufacturer

1.12.32 RMA: Return Material Authorization

1.12.33 COD: Certificate of Destruction

1.13 Semtech Knowledge

Semtech Corporation's supervisors and managers shall determine what knowledge and to what level is necessary for the various operation and processes to achieve conformity of products and services. This training shall be maintained and be made available to the extent necessary pursuant to 7.1.6 of ISO 9001:2015 and IATF 16949. Such training and knowledge may come as a result from several sources such as;

- Source material from customers
- Source material from standards, procedures or specifications
- Education, experience, training
- Process or Product trends or analysis or
- Process modifications or updates

2 Risk Management

The business of Semtech Corporation involves risk. In order for Semtech to be successful Semtech acknowledges that it must consciously take risks where the potential and probability of positive return is high and eliminate or minimize risks that can only detract from success.

Semtech Corporation carries out its business in an environment that is not totally predictable. Semtech's employees, managers, and leadership team make decisions and take actions where the results are uncertain and where the effects of decisions and actions taken by others or of natural events cannot be fully anticipated.

In order to obtain excellent results, Semtech Corporation must be successful in managing its risks and in managing and minimizing the damage associated with "damage risks".

Semtech Corporation has taken action to identify uncertain events and to take action to maximize the contribution of opportunities and to minimize the detriment of dangers. This supports the long term profitable growth in an uncertain business environment.

Where risk management seeks to understand what might go badly in a business decision or business

plan, risks associated with opportunity based risk looks for what might go better.[3]

2.3 *Opportunity Based Risk*

To maximize the positive contributions of opportinity based risk, Semtech Corporation will continuously identify opportunities, set goals, anticipate future change and plan actions to realize opportunities and goals according to the Annual Business Plan, MITs program, management reviews and Performance Evaluations.

Opportunities may arise at any time. The decision to act or not to act on an opportunity should be informed by the relative probabilities of favorable or unfavorable outcomes and by the confidence of associated output.

Some important risk factors are the potential effects of a change in marketing analysis, competition, regulatory requirements, infrastructure, inaction and cost or return on investment.

2.4 *Damage Risk*

Damage risks can arise from the business environment, from the physical environment, from the human environment and from historical events or from unanticipated future events.

To minimize the negative effects of damage risks, Semtech Corporation will identify these types of risks and will evaluate on a regular basis their potential impact and the probability of their occurrence.

Semtech Corporation will take positive steps to determine the source of such risk and will take all reasonable actions to minimize or eliminate the root cause, minimize the potential losses or to compensate for them.

Where no action makes business sense, Semtech Corporation will bear the risk with continuous prudent intelligence to ensure that timely action is taken to minimize exposure to damage associated with such risk.

2.5 *Process Methodology*

Risk management can be described as the process of proactively working with stakeholders to minimize the risks and maximize the opportunity associated with good management decisions.[5] Risks are about the possibility of an adverse consequence.[6]

Good risk management relies on adaptability in response to change.[7] Risk management ensures that Semtech Corporation identifies and understands the risks to which it is exposed.

Semtech Corporation continuously face environments in which uncertainty is constantly challenging the existing ways of doing business and the way that risk needs to be managed. However, the upside to risk, that is often overlooked, is that the feared uncertain event could have a desired outcome. This is a positive risk or opportunity and needs to be managed to ensure a good result. Having a clear understanding of all risks allows Semtech to measure and prioritize them and take the appropriate actions to reduce losses.[9]

Opportunity management is the process that converts the chance to decisiveness and is increasingly becoming embedded in the culture of organizations as they mature and broaden their understanding of the value that managing uncertainty can bring.

Semtech Corporation acknowledges that in order for positive risk or opportunity management to be effective in creating or protecting value it has become an integral part of the management processes, and embedded in the culture and practices throughout Semtech.

Semtech Corporation has listed some internal elements associated with opportunity risk which include;

- Customer
- Marketing
- Quality
- Business Units
- Legal
- Design
- Operations
- Sales

Refer to Appendix G: Process Map for Internal Risk – Risk Management Opportunity

Semtech Corporation has identified key risks and assigned a method of impact – probability rating to each. Refer to Appendix H: External Risk – Risk Impact / Probability Chart

Semtech Corporation has identified several external risks which include;

- Technology
- Market
- Competition
- Customer
- Material Sourcing Vendor
- Supplier Sourcing Backup
- Supplier Resources
- Supplier Certification
- Semtech Certification

2.5.1 Risk Rating Assignment

Semtech Corporation assigned ratings to each element of the risk based on experience, training, and input from stakeholders.

Impact Probability chart and process assigns a rating to Impact, Probability, Detectability then through a simple calculation

- $\frac{\textbf{\textit{Impact X Probability}}}{\textbf{\textit{Detectability}}}$

2.5.2 Ratings Definitions

Ratings assigned are based on the calculation noted in the table referenced above. Ratings levels span;

- 1; Trivial
- 2; Tolerable
- 3; Moderate
- 4; Substantial
- 5; Intolerable

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Refer to Appendix H: External Risk – Risk Impact / Probability Chart for actions associated with the ratings.

2.6 Reference Documents – Additional Details

Semtech Document #	Cat	Title
SEMDOC004964	Quality	Risk Management Program

3 Context of the Organization: Semtech Corporation

Semtech Corporation, incorporated on December 19, 1960, is a supplier of analog and mixed-signal semiconductor products. Semtech Corporation designs, develops and markets a range of products for commercial applications, which are sold into the enterprise computing, communications, consumer and industrial end-markets. Semtech Corporation's product lines include Signal Integrity, Protection, Wireless and Sensing, and Power and High-Reliability. Applications for the industrial market include video broadcast studio equipment, automated meter reading, smart grid, wireless charging, military and aerospace, medical, security systems, automotive, Internet of Things (IoT), industrial and home automation, video security and surveillance, and other industrial equipment. Enterprise computing end-markets include desktops, notebooks, servers, graphic boards, printers, monitors, datacenter related equipment, passive optical networks, storage networks and computer peripherals. Communications end-market applications include third generation (3G) or fourth generation (4G) or Long Term Evolution (LTE) wireless base stations, long-haul optical networks, carrier networks, switches and routers, cable modems, signal conditioners, wireless local area network (LAN) and other communication infrastructure equipment.

3.1 Signal Integrity Products

Semtech Corporation designs, develops and markets a portfolio of optical communications, broadcast video, surveillance video, active cable transceiver and backplane products used in a range of enterprise computing, industrial, communications and consumer applications. Its portfolio of integrated circuits (ICs) for optical transceivers, backplane applications and high-speed interfaces ranges from 100 megabits per second (Mbps) to 100 gigabits per second (Gbps). Its security and surveillance products for high-definition closed circuit television (HDcctv) enable upgrade of analog closed circuit television installations to digital HD, using the installed base of coaxial cable (COAX) cabling, and its integrated transmit and receive products enable the HDcctv standards-compliant designs.

Semtech Corporation sells advanced wired communication and ultra-high speed Serializer/Deserializer (SerDes) products for long haul optical transport communication.

3.2 Protection Products

Semtech Corporation designs, develops and markets protection devices, which are referred to as transient voltage suppressors (TVS). Its portfolio of protection

solutions include filter and termination devices that are integrated with the TVS device. Its protection products are found in a range of applications, including smart phones, liquid crystal display (LCD) televisions (TVs), set-top boxes, tablets, computers, notebooks, base stations, routers, automobile and industrial instruments.

3.3 Wireless & Sensing Products

Semtech Corporation designs, develops and markets a portfolio of radio frequency products used in a range of industrial, medical and communications applications, and sensing products used in industrial and consumer applications. Its sensing interface platforms can interface to any sensor and output digital data in any form. The proximity sensing capability of its devices enables user interface solutions for mobile and consumer products. Its wireless and sensing products can be found in a range of applications in the industrial, medical and consumer markets.

3.4 Power & High-Reliability Products

Semtech Corporation designs, develops and markets power product devices that control, alter, regulate and condition the power within electronic systems. The product types within the power product line include switching voltage regulators, combination switching and linear regulators, smart regulators, charge pumps and wireless charging. Its Power products feature integrated functionality for the communications, industrial and computing markets, and small form factor products for mobile phones, notebook computers, computer peripherals and other consumer devices. The primary application for these products is power regulation for enterprise computing, communications, consumer and industrial systems. Its discrete semiconductor products consist of rectifiers, assemblies (packaged discrete rectifiers) and other products that are used to convert alternating currents into direct currents, and to protect circuits against high voltage spikes or high current surges. Its products are found in a range of applications, including industrial, military, medical, automotive, aerospace and defense systems, including satellite communications.

3.5 Semtech's Competition

The Company competes with STMicroelectronics, NXP Semiconductors N.V., ON Semiconductor Corporation, Infineon Technologies AG, Texas Instruments Incorporated, Maxim Integrated Products, Inc., M/A-COM Technology Solutions Holdings, Inc., Inphi Corporation, Broadcom Limited, Applied MicroCircuits Corporation, Texas Instruments Incorporated, Linear Technology Corporation, Maxim Integrated Products Inc., Microsemi Corporation, Monolithic Power Systems, Silicon Laboratories, , Atmel Corporation, Analog Devices Inc. and Cypress Semiconductor Corp.

3.6 Interested Parties

Semtech Corporation strives to consistently provide product and services that meet our customer and any applicable regulatory requirements. In the context herein Semtech has identified its interested parties and noted their needs and expectations.

- Sales & Marketing expect timely release of product documents and customer request processing
- Business Unit Management and Engineering expect processing of Non-Conforming Material Requests, and new products timely release to market
- Quality & Reliability expect timely processing and closure of corrective action request
- Operations group expect complete reliability testing on new products and notification when failures occur
- External Customers expect robust and low cost product. Timely response to quality issues, closures on corrective actions and request for product information
- Suppliers expect Semtech engineering and quality support to address potential product issues, periodic performance review, and support for customer visits and audits

4 Core Values

Semtech's Leadership Team (SLT) has developed this list with the idea of "**pursuing work and life with enthusiasm, creativity and a passion for excellence**" embodied in five Core Values.

- **Teamwork and innovation in all areas**
- **Treat all individuals with dignity and respect**
- **Honesty and integrity in all we do**
- **Open and direct communications**

- **Fiscal responsibility**

The SLT has defined these core values within a few key points.

4.1. Teamwork & Innovation In All Areas

Key points;

- Common purpose; we all need to row in the same direction
- Create an environment that facilitates freedom to innovate & achieve extraordinary results
- Take measured risks
- Challenge the status quo

4.2. Treat All Individuals With Dignity & Respect

Key points;

- Treat people the way you want to be treated
- Attack the problem not the person
- Respect and value diversity of experience, culture and opinions
- Learn from everyone – peers, subordinates, bosses, competitors and customers

4.3. Honesty & Integrity In All We Do

Key points;

- Never compromise your integrity
- Hold everyone accountable and recognize each other's contributions
- Explicitly communicate goals and standards of behavior
- Do the right thing even when no one is looking or will ever find out

4.4. Open & Direct Communications

Key points;

- Communicate clearly and candidly
- Challenge people, but learn to listen
- Focus on what is right not who is right
- Acknowledge that debate contributes to productive meetings

4.5. Fiscal Responsibility

Key points;

- Focus on efficiencies of time, work effort, decision making and $ expenditures
- Build a plan and work to meet or exceed that plan
- Treat every $ of the company's money respectfully
- If in doubt, ask your boss

5. Quality Policy / Leadership Focus

Semtech's Leadership Team has determined that the following quality policy: best expresses their overall intentions and directions for the corporation; includes our commitment to meeting and/or exceeding customer requirements; and, provides a framework for establishing and reviewing quality objectives.

Semtech's Leadership Team reviews this quality policy for suitability periodically throughout the year. Whenever the quality policy is modified, the change shall be communicated using 'best practice' methods to ensure the quality policy is understood at appropriate levels in the organization. First, Corporate and Business Unit Managers will review the change during their regular Staff meetings. Second, Corporate Quality Manual is updated and routed on ECO for approval. Third, each Site ISO Representative will prepare and send notification using e-mail to appropriate employees. Each site is encouraged to post professional displays of the quality policy as suitable to the environment. Finally, all existing policy statement displays will be changed to reflect the new policy.

Semtech measures the effectiveness of the Quality Policy through a variety of channels. They include but are not limited to;

- Design wins
- Marketing and comparative analysis
- New product introduction through product realization
- Customer Report Cards
- Quality system cycle time improvements
- Supplier and Internal quality audits

Quality Policy

Semtech Corporation pledges to provide ever-improving value and satisfaction to our customers by:

- ***Providing innovative and technically superior products and services that meet or exceed their expectations;***
- ***Continuously improving our organizational performance and capabilities;***
- ***Performing our work to the highest level of quality workmanship;***
- ***Ensuring that our subcontractors and suppliers meet and exceed our quality standards;***
- ***Establishing and reviewing key performance measures & objectives, taking action as needed; and,***
- ***Working to achieve the lowest cost of ownership for our customers and suppliers.***

5.1 Achieving Semtech's Goals / Planning Focus

5.1.1 Policy Goal #1:

Provide innovative and technically superior product and services that meet or exceed our customer's expectations through;

- marketing and competitive analysis driving more complete business concepts
- customer collaboration on new product introduction and ideas to help drive prototype evaluations
- utilize up to date and innovative design tools and modeling techniques

5.1.2. Policy Goal #2:

Continuously improving our organizational performance and capabilities by;

- measuring our performance against our competitors through customer and other 3rd party audits,
- taking action when necessary such as creating Preventive Action or Continuous Improvement Projects in PLM.

5.1.3. Policy Goal #3:

Performing our work to the highest level of quality workmanship through;

- comprehensive training and On The Job training
- measuring production output to sustain customer orders
- qualifying core suppliers that meet or exceed our industry certification requirements
- monitoring process Cpk
- conducting supplier audits to ensure compliance to Semtech and customer requirements

5.1.4. Policy Goal #4:

Ensuring that our subcontrators and suppliers meet and exceed our quality standards by;

- Perodic performance assessments such as Quarterly Business Reviews between Semtech's executive management, operations and quality and supplier's executive management
- Flow down customer requirements to suppliers and relevant Semtech stakeholders when received through customer request process
- SQE will monitor supplier processes to ensure no supplier changes occur without Semtech's direct approval

5.1.5 Policy Goal #5:

Establishing and reviewing key performance measures & objectives, taking action as needed by;

- holding periodic management reviews between executive management and their staff weekly, quarterly or semi-annually
- conduct annual MITs and performance evaluations meeting established objectives and goals

5.1.6 Policy Goal #6:

Working to achieve the lowest cost of ownership for our customers and suppliers by;

- With every new design or new technology, Semtech's marketing, design and product engineering with operations and SQE conduct process evaluations and new product designs utilizing alternative material and supplier sources for the most cost effective product without compromising product quality

6. Semtech's Leadership Team Commitment and Responsibilities / Leadership

Semtech's Leadership Team is responsible to identify resource requirements, provide adequate resources and assign trained personnel for management, performance of work and verification activities including internal quality audits. The leadership team can provide evidence of its commitment to the development and implementation of the QMS and continually improve its effectiveness by communicating to the company of meeting customer as well as statutory and regulatory requirements, establishing the quality policy, ensuring that quality objectives are established, conducting management reviews and ensuring adequate resources. The President and CEO of Semtech Corporation, along with his leadership team, have taken the responsibility and authority as defined within this manual and other relevant corporate documentation, to empower and designate key personnel. This has been communicated and continues to be communicated through our employee indoctrination training.

Additionally, Semtech's Leadership team can ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction.

6.1. Most Important Tasks (MITs)

Semtech establishes quality performance objectives at relevant functions and business units by setting quarterly **M**ost **I**mportant **T**asks (MITs). These performance objectives may include: customer, product, service, operations, market, competitive comparisons, continual improvement, supplier, employee, resource, cost and/or financial objectives. Each Senior Manager: determines in his/her function or business unit the personnel who will have MITs goals; ensures that MITs are measurable and consistent with the quality policy; and, scores the individual's performance to MITs at the end of the quarter or annually as applicable.

MITs goals are considered company confidential and are only auditable by Semtech's ISO registrar.

Approved MITs Score sheets are the quality records for this QMS element.

6.2. Department Roles & Responsibilities / Leadership Focus

6.2.1 Administration & Finance

Finance provides timely and accurate financial information to managers; analyzes and reports results of operations; identifies, analyzes and reports key sales and operational trends; and, ensures adequate internal controls exists over the Company's assets. In addition Finance ensures assets and liabilities are properly stated and valued in financial reports; prepares accurate financial reports for internal (managers) and external (IRS, SEC) customers. Finance strives to maximize return on assets and equity; and, ensures the Company operates to drive value for our shareholders, customers and employees.

Administration creates support infrastructure in order to empower our employees and ensure customers and vendor's requirements are fully supported.

6.2.2 Chief Marketing Officer (CMO)

Chief Marketing Officer leads sales management, product development, distribution channel management, marketing communications (including advertising and promotions), pricing, market research, and customer service. The CMO is a member of the SLT and participates in corporate and board level meetings and reviews.

The CMO leads activities to establish corporate strategies by monitoring, analyzing and reporting major market trends utilizing some marketing concepts such as;

- **Analytical tasks**, such as pricing and market research,
- **Creative tasks** such as designing advertising and promotions,
- **Interpersonal tasks** such as coordinating many different styles of thinking in a single team.

The CMO responds quickly to changing circumstances in the industry, and must formulate a plan to bridge the company's understanding of a

particular product, sales strategy, or marketing idea. Each of these products comes from a different business unit, so the CMO must be a nexus of information: it is a highly receptive role, with involvement in departments such as, but not limited to, production, information technology, corporate communications, documentation, public affairs, legal, human resources, and finance.

6.2.3 Chief Technical Officer (CTO)

Chief Technical Officer leads activities to establish corporate strategies by monitoring, analyzing and reporting major market trends and advances in product and process technology. Corporate Technical Officer participates in the Business Unit's product and technology road map discussions and ensures that the 'served available market (SAM)' for the served platforms is increased by identifying adjacent product opportunities. CTO actively pursues product opportunities via various means such as: intellectual property licensing, product licensing, company acquisition, product line acquisition or by taking an equity position in start-up companies.

6.2.4 Human Resource

The Human Resource (HR) Department contributes to the bottom-line performance by developing and implementing world class HR business processes, programs and services that attract retain and motivate employees. These business processes ensure that managers are equipped with the tools and knowledge necessary for creating and maintaining a productive and inspiring working environment while optimizing the potential of the human resource at Semtech. Develop monitor and track employee training and development goals while sustaining the Learning Management System tool.

6.2.5 Sales & Marketing

Sales & Marketing (S&M) provides the corporation timely and accurate booking forecasts by region: by customer, and, by product. Sales and Marketing also manages order entry while providing company-wide sales administration. In addition, S&M communicates with customers on all aspects of business such as pricing, delivery information and backlog management. Through the field application engineering organization, S&M drives design win activities that support future company growth. Sales and Marketing implements product, platform and field sales strategy defined jointly with business units. Sales and Marketing are responsible for market communication, public relations and advertising.

6.2.6 Information Services

Information Services establishes the enterprise-wide information & communications architecture; selects information & communications technology standards in support of the implementation of the enterprise-wide information & communication architecture; coordinates the investigation and implementation of emerging information & communication technologies and services across the enterprise; assists in the identification of business opportunities and implementing business applications to meet corporate and enterprise-wide business requirements; and, provides enterprise-wide executive education to improve awareness of the impact of information technology on the business.

6.2.6.1 Reference Documents – Additional Details

Semtech Document #	Cat	Title
AROS-7STPKY	IT	IT Change Management Policy
AROS-7STPND	IT	SDLC Major Change Procedure
AROS-7STPPQ	IT	SDLC Minor Change Procedure

6.2.7 Operations & Manufacturing

Operations and Manufacturing group implements, maintains and continuously improves a company-wide operations, manufacturing, planning and inventory tracking system that assures product quality, product built to the highest level of quality workmanship, meeting customer requirements, company goals and expectations and customer satisfaction. Operations group leads and promotes total quality management values, practices, and principles to continuously reduce cost of product ownership by improving manufacturing performance and capability through a system of measuring key performance indicators and objectives for our suppliers including investment in advanced technologies, equipment, and facilities.

6.2.7.1 Zero Defect Manufacture

In the course of manufacturing product, Semtech Corporation ensures that process capabilities will satisfy automotive quality requirements to meet the zero (0) defect target.

1. Develop and execute an Advanced Product Quality Planning (APQP) with zero defect target
2. Develop and monitor Design FMEAs to identify risk and prioritize mitigation

3. Utilize mature technologies and measure Cpk of critical manufacturing processes
4. Develop and monitor Process FMEAs to identify risk and prioritize mitigation
5. Minimize variation in products by applying best practice for; Statistical Process Control - SPC, Statistical Bin Analysis - SBA, Statistical Bin Limit - SBL, and Part Average Testing – PAT.
6. Apply Measurement System Analysis ("MSA") pursuant to AIAG reference standard, to determine the extent to which a variation within the measurement process contributes to overall process variability.
7. Gather data and product information supporting Production Part Approval Process (PPAP)
8. Plan and apply an enhanced control plan to screen product with any outlier characteristics.
9. Qualify automotive and specific application product to meet AEC Q100, Grade 1 or Grade 2 requirements.
10. Plan and perform on going reliability testing (ORT) to guarantee the stability and conformity to specifications over product's lifetime.

6.2.7.1.1. Reference Documents – Additional Details

Semtech Document #	Cat	Title
SEMDOC004883	QA	APQP Process & Procedure
KFID-4JCSEQ	QA	Quality Planning
SEMDOC004418	QA	PPAP Process

6.2.7.2 Failure Rate

Semtech Corporation is committed to reach a zero (0) defect quality standard. In order to accomplish this, defects are measured by defective parts per million produced ("PPM rates"), and reviewed quarterly by Semtech management and shared with our manufacturing partners. Continuous improvement is required with all ppm goals to reach the zero (0) defect target. Semtech calculates the failure rate from all confirmed nonconforming returned Products.

6.2.8 Quality & Reliability

Quality & Reliability (Q&R) implements, maintains and continuously improves a company-wide quality system that assures product quality, reliability and customer satisfaction. Quality & Reliability leads and promotes *total quality management* values, practices, and principles to continuously improve performance. Quality & Reliability demonstrates Semtech's effective quality system to us and to our customers by achieving and maintaining registration to ISO 9001 & IATF 16949, AS9100 and MIL-PRF-19500 quality systems standards. Quality & Reliability leads the effort on continuous improvement of our current quality system to meet the ISO 9001 & IATF 16949 standards as well as pursuit of other industry and professional quality system standards.

5.2.9. Supply Chain Management

The Vice President of Supply Chain Management, VP SCM, drives the supply chain processes and systems to ensure Semtech's senior management commitment and execute strategic decision making. The VP SCM has emerged as a key stakeholder in the company to make supply chain transformation happen. Semtech's Leadership Team expects the supply chain organization to deliver more than just efficiency – it is being asked to deliver innovative cost reduction strategies to help grow the company and to present a market strategy differentiator. A goal of the SCM organization is to review the supply chain process in order to find opportunities to improve Semtech's supply chain planning processes and supply chain technology improvement.

Supply chain planning is the part of the end-to-end Supply Chain Management (SCM) with the potential to provide market differentiation for Semtech Corporation. The specific processes that are an integral part of SCM are: supply chain network design, demand forecasting, inventory optimization, supply planning, and Sales & Operational Planning, S&OP.

Sales and operations planning (**S&OP**) is an integrated business management process through which the executive/leadership team continually achieves focus, alignment and synchronization among all functions of the organization.

Supply Chain Management and Planning serves as a solution to enable Semtech to achieve supply and demand goals through greater optimization of inventory management, forecasting, customer service and finance.

6.2.10 Business Development

6.2.10 Business Development

The Vice President of Business Development is responsible for new business generation through marketing activities, business prospect identification, nurturing & closure. In the area of new business acquisition, penetrate target accounts and uncover new companies and stakeholders, and support Semtech account managers with qualified sales opportunities.

6.2.10.1 Artificial Intelligence

The Artificial Intelligence Group was established to pursue vertical market opportunities including sophisticated, yet simple-to-create, intelligent IoT systems and products using 'Aimmi'. Aimmi is a highly scalable, real-time, self-adapting, rule and pattern-based feedback control system. This system accepts multiple inputs from any sensor or online data source, synergistically combines these to make intelligent decisions, and then initiates the suggested actions. The initial focus of our AI team will be on LoRa based products for water usage optimization.

6.3 Business Unit Manager's Roles & Responsibilities / Leadership Focus

Semtech Corporation organizes product lines into business units. Senior Staff determines the number, scope, product lines and market segment for each business unit. Business units are added or scope changed as the corporation grows.

Each business unit is lead by a Business Unit Manager. Each Business Unit Manager select, designs and qualifies leading edge products, sources manufacturing, and sells and markets a wide range of products in their selected markets.

Up-to-date information on Semtech's Business Units and the products associated with the business unit can always be found on Semtech's Web Site: www.semtech.com.

7. Management Representative(s)

The Executive Vice President of Quality & Reliability appoints member(s) of management who, irrespective of other responsibilities, has responsibilities and authority that includes: ensuring that processes of the quality management system are established and maintained; reporting to Semtech's Leadership Team on the performance of the quality management system, including needs for improvement; and, promoting awareness of customer requirements throughout the organization.

These appointments are documented as site Quality Managers in Appendix C 23.2 Q&R's Functional Organization Chart. The designated Corporate ISO Management Representative serves as the ISO Management Representative for Semtech Corporation as well as for sites where a site representative is not available.

At such sites, a liaison is identified and aids in any dissemination of materials or scheduling of training for personnel at that site. These liaisons work closely with the Corporate ISO Management Representative.

8. QMS Continuous Improvement / Planning

The Executive Vice President of Quality & Reliability, orchestrates the management's review of Semtech's QMS on a quarterly basis. He/she shall ensure that improvements to the QMS are conducted in a controlled manner and that the integrity of the QMS is maintained during the improvements. The QMS review for continuous Improvement may take into consideration management review findings; results of internal, customer and supplier audits; customer feedback; process performance, cycle times, product conformance, and special needs of Semtech's internal customers.

Complete Management Review of the QMS Continuous improvement efforts are quality records and placed in PLM as Continuous Improvement Projects (CIP).

9. Customer Focus

9.1. Customer Care

Semtech Corporation maintains a worldwide **C**ustomer **C**are **A**ction **Re**quest System commonly referred to as the CCARE system. This CCARE process is comprised of two types of customer requests, Logistical and Complaints. Logistical CCare system logs and tracks customer issues such as: Return Material Authorizations, Repair Disposition Authorization, scrap allowances, marketing incentive programs maintained within Semtech's ERP, SAP. Customer complaints, requests for failure analysis are logged and tracked within SalesForce (SFDC). The CCARE process and its support systems are implemented corporate wide.

9.2. Customer Care Policies

- Semtech employees can initiate the CCare process whenever a customer issue(s) needs to be addressed that cannot be resolved within 24 hours and a response to the customer is either required or desirable. At this point of the process, a meaningful dialog is opened with the customer and key Semtech stakeholders.
- Semtech employees interface with a member of Semtech's sales group to get the proper Logistical or Complaint driven inquiry initiated and workflows routed..
- Data contained or generated within the CCare process / application are the quality records for this QMS element.

9.3. Process Description Overview

Any Semtech employee may initiate the CCare process. The site Quality Assurance (QA) Advocate and Inside Sales Representative reviews each request. Once accepted, SAP, or the SFDC auto-generates and forwards an acknowledgment to the customer. This signifies that Semtech is aware of a customer issue. Customer Acknowledgement is dispatched within 24 hours of acceptance or approval.

The QA Advocate is auto-assigned based on the product and business unit affected. The Quality Advocate coordinates all Semtech activities/resources worldwide to address the CCare to the satisfaction of the customer. The Advocate goal is to verify the CCare with the Customer within 72 hours. Verification to the customer signifies to the customer that Semtech accepts the CCare and will tra8ck it until closure.

The Quality Advocate may send interim reports to the customer as appropriate.

The CCare system uses the 8D corrective action problem solving method.

Upon completion of the CCare, the Quality Advocate posts reports, data or corrective actions within the system as necessary. The Quality Advocate closes the CCare which triggers notification to the customer account / sales representative and Field Applications Engineer (FAE) to download and sends to the customer the final report and if applicable Corrective Action report. This CCare closure process signifies that Semtech has concluded all activities and closed the CCare. The Quality Advocate makes every effort to close all CCares within 17 days from acceptance.

9.3.1. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element and measures the effectiveness through cycle time to complete FA cases.

9.3.2. Reference Documents – Additional Details

Semtech Document #	Cat.	Title
PLOT-4LJP6Z	Quality	CCare Program & Instructions

9.4. Customer Requirements Review

Semtech reviews customer requirements prior to our commitment to supply product(s). These procedures ensure that:

- Product requirements are clearly defined;
- Contracts or order requirements differing from those previously expressed are resolved; and
- We have confirmed Semtech's ability to meet the defined requirements.

When a product requirement changes, Semtech will raise a "Change Order" or "Customer Request" against that document to review and approve changes and ensure that relevant personnel are made aware of the changed requirements.

The Customer Request (CR) process within PLM ensures appropriate communication with customers in relation to product information, inquiries, contracts or order handling, customer feedback and amendments.

Records of these reviews are posted and maintained as quality records within PLM as Customer Requests.

9.4.1 Process Description Overview

Sales and Marketing raises a Customer Request; Document Review whenever a customer submits a document to Semtech and requests a formal review, and it cannot be resolved thru the Purchase Order system.

Examples of document types include but are not limited to: product specifications, general procurement guidelines and procedures, drawings, terms and conditions, quality system requirements etc.

Customer Requests: Document Reviews are initiated prepared and stored within PLM as quality records.

The originator first reviews the documents already in PLM to determine if the document was previously reviewed.

If the document was already reviewed and our response is still applicable, then our response is sent to the customer.

If the document was already reviewed and our response is no longer applicable, a new Customer Request is initiated. The document is reviewed again for adequacy.

9.4.1.1. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element.

9.4.1.2. Reference Documents – Additional Details

Semtech Document #	Cat	Title
SFBN-53SU7Y	Quality	Reviewing Customer Requirements
SEMDOC000724	Quality	Customer Request Process & Procedure

9.5. Customer Notifications

Semtech Corporation provides four types of change notification to our customers: Change Notifications, End-of-Life Notifications, Waivers and Quality Alerts.

9.5.1 Change Notifications

Semtech provides a 90 day advanced notification to customers who have entered into a notification agreement. In general, Semtech notifies; whenever possible, on major product or process changes that affect the form, fit, function or reliability of products. Should business conditions warrant a less than 90-day notification, it will be specified in the change notification letter.

Customers will be provided an opportunity to accept/reject a change within the specified period. If a customer does not respond within the specified period, Semtech will assume that the customer has accepted the change.

Customers who maintain a notification agreement with specified customer requirements will be adhered to.

For customers who do not accept the change, Sales, Marketing, Operations and Q&R will work with the customer to determine the next step(s).

Semtech can postpone the change until the outstanding customer(s) have approved or rejected the change.

Semtech reserves the right not to follow through with a change published in a Process Change Notification if the qualification of the change is unsuccessful or if business conditions require that the proposed change be discontinued. Under such situations, a change cancellation will be dispatched to customers where a change notification has been previously made.

9.5.1.1. Policy – Automotive Product

Semtech has accepted the automotive standard with regards to changes affecting automotive grade product and customer requirements.

- Product or Process changes affecting form, fit, function, reliability, or quality must have customer approval before shipping.
- The customer response requirements noted in JEDEC 46 will not apply.
- Product or Process changes affecting Automotive grade product will be communicated to customers on its own PCN Form and not combined with standard catalog product.
- Automotive PCNs will have their own unique PCN number for complete traceability, tracking, document gathering, review and approval process.

9.5.2. End-of-life Notification

Whenever the company determines it will no longer manufacture certain product(s), Semtech will issue an End-of-Life (EOL) notification to all customers who have purchased the affected product(s) within the previous 24 months and who maintains a notification agreement with Semtech.

The notification will contain a last time buy date for the affected product(s). Customers may place an order for the product any time prior to the last time buy date.

Semtech will make all reasonable attempts to provide a 180 day advanced notification on the company's intent to discontinue the manufacture of certain products. Should business conditions warrant a less than 180-day notification, it will be specified in the notification letter.

The notification may contain references to suitable replacement parts; or, indicate the last day that the company will ship the affected products.

9.5.3. Waivers

Whenever Semtech business unit engineering, operations or Quality Assurance determines that certain product will not fully meet customer or Semtech standards or requirements, a waiver will be generated and forwarded to the customer.

Signed customer approval must be received and posted in PLM BEFORE affected product is shipped.

Under emergency conditions, an email, noting acceptance of the waiver is allowed and shipment can be made. However, business unit engineering and sales must follow up with the customer to obtain a signed waiver.

9.5.4. Quality Alerts

Whenever Quality Assurance determines that certain product is discrepant and has already been shipped to customers, Quality Assurance raises a Quality Alert notification to advise customers of the discrepant product.

The Quality Alert contains a description of the discrepant condition, a listing of affected products, and appropriate traceability information such as date codes and lots numbers. In addition, instructions will be provided on how to handle the discrepant product or return the product for replacement. A return material authorization (RMA) number maybe included if appropriate. If known at the time the Quality Alert is issued, it may also contain the root cause, corrective and preventive actions.

9.5.5. Process Description Overview

Quality Assurance is responsible to process Change Notifications and Quality Alerts using the Customer Documents application database. Request for End-of-Life Notification can come from a business unit representative, operations staff or from the Sales group. The End-of-Life process is also initiated and prepared in PLM Document Management System along with an ECO changing the lifecycle of the affected finished good or material source from Production Ready to End of Life.

Once prepared, the document is circulated to appropriate personnel for review and approval. After approval the notification is sent to the customer using e-mail.

- Semtech Corporation uses the applicable PLM quality process and workflows to generate, prepare, track and gain approval for the quality processes referenced in 8.3.

9.5.6. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through timely notifications and tracking customer responses.

9.5.7. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4JCQ2S	Quality	Customer notification & Disclaimer guidelines Affecting Semtech products

9.6. Failure Analysis

Semtech's Failure Analysis (FA) Lab contains state-of-the-art optical analysis, imaging and material analysis, video imaging and storage, non-invasive inspection equipment, package decapsulation, automated test equipment (ATE) as well as reactive ion etching, a scanning electron microscope and a wet chemical bench. In order to ensure rigorous tracking and prompt response back to our customers, customer FA jobs are submitted through the CCare process via SFDC and monitored and tracked through PLM.

9.6.1. Policies

- Any Semtech employee may submit a Failure Analysis job on behalf of a customer using the CCare process / system resulting in a case generation in Sales Force (SFDC).
- Data contained in the CCare process / system, SAP and SFDC, and PLM are the quality records for this QMS element.

9.6.2. Process Description Overview

Any Semtech employee may initiate a Failure Analysis job on behalf of a customer using Sales Force (SFDC), customer complaint system. The site Quality Advocate and Inside Sales Representative reviews each request. Upon approval of the complaint request, the SFDC system and SAP generate an **R**eturn **M**aterial **A**uthorization tracking number (RMA) within the authorization letter. This letter is sent automatically to the customer with information as to where to send the material. This process confirms to the customer that the devices may be returned to Semtech for Failure Analysis. Once the suspect parts are received, the QA Advocate and Inside Sales Representative (ISR) are auto-notified, a system generated acknowledgement letter is sent to the customer. The Failure Analysis (FA) group is also notified. The FA group generates a Failure Analysis request in PLM, which will help in monitoring, tracking the report review and approval process. Customer acknowledgement is sent within 24 hours upon receipt of material.

The FA Lab's goal is to verify pass/fail status of the suspect parts in less than 4 days from receipt of parts. The FA Analyst serves as the Quality Advocate until the root cause is determined. The FA Lab makes every effort to determine the root cause for failed devices in less than 14 days from receipt of parts. Interim reports are sent to the customer as necessary. Once root cause is determined, the FA Lab issues a final report to the customer, signifying root cause has been determined and the FA job is being closed.

If additional corrective action is required to ensure diagnosed non-conformities do not recur, the CCARE will remain open as the 8D corrective action problem solving method continues. Once the FA Job is closed, the QA Advocate will continue to coordinate all Semtech activities/resources worldwide to address the CCARE to the satisfaction of the customer.

The Quality Advocate may send interim reports to the customer as appropriate.

Upon completion of the CCARE, the Quality Advocate will post the final report, data, and if applicable corrective action with the Case file in SFDC. The Case is closed which will trigger notification to the ISR and FAE to download the reports and send them to the customer. If warranted, the Final FA Report may serve as the closure letter. The closure letter to the customer signifies that Semtech has concluded all activities and closed the CCARE. The Quality Advocate strives to close all CCARES within 17 days from acceptance.

9.6.3. Responsible Function/Department

Quality & Reliability ensures the effectiveness of this QMS element through timely response and closure.

9.6.4. Reference Documents – Additional Details

Semtech Document #	Cat	Title
PLOT-4LJP6Z	Quality	CCare Program and Instructions

10. Quality Planning / Operations & Planning Focus

Quality planning for Automotive Grade product is an integral part of each stage in the review process of customer requirements from the request for quote to design input through final delivery. It is a comprehensive system that shall give consideration to the following activities to manage risk while meeting Semtech's and our customers' requirements.

10.1. Process Description Overview

Semtech has developed a set of top level guidelines for automotive grade product from conception through design, test and release utilizing industry established checklists and data gathering to achieve the required quality meeting Semtech's and our customers' requirements as noted below:

- Quality and Engineering *will* review and determine capability of supplier through the Advanced Product Qualification Plan (APQP) checklists. Work with supplier, SQE group, and engineering to resolve any inconsistencies or gaps found in *the* APQP Submittal checklist.
- Marketing review of new product business case to determine which product should be qualified to AEC Q100 and determine what grade.
- Reliability group *will* review and develop qualification plan based on marketing input and industry standard using AEC Q100 guidelines.
- Quality group *will* review and initiate Production Part Approval Process (PPAP) document gathering activities.
- Quality group will review part BOM and add part and product information into International Material Data System (IMDS).
- Quality group will develop and sustain a process and product support group throughout the life cycle of the product. This team will be chaired by the business unit quality manager and the members will include packaging, failure analysis, product engineering, test engineering, and SQE supporting fabrication and assembly.
- Sustain product traceability and quality records for twenty (20) years. Traceability and quality record maintenance is defined between the automotive supplier at fifteen (15) years and an additional five (5) years upon transfer to Semtech's document management system.

10.2. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4JCSEQ	Quality	Quality Planning
SEMDOC001496	Quality	International Material Data System (IMDS) Process
SEMDOC004883	Quality	Advanced Product Quality Planning Procedure
APQP Submittal Checklist	Quality	APQP Submittal Checklist
SEMDOC004418	Quality	Production Part Approval Process Procedure
SEMDOC000724	Quality	Customer Request Process & Procedure

11. Management Review / Performance Evaluation

Semtech continually reviews the quality management system to ensure its suitability, adequacy and effectiveness using four key methods: QMS Review for Continuous Improvement, Quarterly Business Reviews, and Site QMS Reviews. In combination, these methods evaluate the need for changes to our QMS including the quality policy and quality objectives.

Based on these reviews, strategic or long term improvements needed to our QMS are addressed and documented within the Management Review prepared by Q&R. Short Term Improvements to our QMS are addressed and documented in quarterly 6.1. Most Important Tasks (MITs). Issues needing immediate attention are addressed as appropriate.

11.1. QMS Continuous Improvement / Improvement & Performance Focus

Semtech reviews the suitability and effectiveness of our quality management system through periodic management reviews. Q&R sponsors and conducts these management reviews at least quarterly. The QMS review for continuous Improvement may take into consideration management review findings; results of internal, customer and supplier audits; customer feedback; process performance, cycle times, product conformance, and special needs of Semtech's internal customers.

The Executive VP of Q&R makes the final determination on the scope of any major continuous improvement project and then instructs the Corporate ISO Management Representation to begin implementation.

For each QMS element in Semtech's quality manual, the management review solicits feedback on: What is working well; Improvements made since the last review; What is not working; and, Suggested actions for improvement.

The QMS management review also determines whether the quality policy should be amended.

These management reviews may take on several forms. The QMS elements may be addressed in whole or broken down by elements.

Internal Communication, as defined within ISO 9001 & IATF 16949, has been accepted and adopted by Semtech to ensure that appropriate communication processes are established and that such communication takes place regarding the effectiveness of the QMS.

Q&R records all the inputs from the management reviews and documents the improvement efforts. This documentation is the quality record for reviewing the effectiveness and suitability of Semtech's quality management system.

11.2. Quarterly Business Reviews

Semtech conducts regular business reviews at the corporate headquarters, or at the discretion of the CEO, remote business unit site. The measures or indicators reviewed best represent the factors that lead to improved customer, operational, and financial performance. These comprehensive set of measures or indicators tie to customer and/or organizational performance requirements representing a clear basis for aligning all activities with the organization's goals through the 5.1 Most Important Tasks (MITS) process.

The Executive Vice President of Q&R prepares and delivers a comprehensive review of the company's quality, reliability, failure analysis findings, CCARE, internal audits, supplier performance, follow-up from prior reviews, and progress against the QMS Continuous improvement efforts.

11.3. Responsible Function / Business Unit

Q&R tracks actions/decisions made which are treated as quality records when so generated and posted within PLM or attached as an item within a quality process workflow.

Q&R tracks agendas, minutes, decisions, actions and/or suggested improvements from these

business reviews. These are treated as quality records and stored in PLM Discussion application designed for tracking meetings and action items.

11.4. Site QMS Reviews

Each Semtech site with a named ISO Site Management Representative as defined in, 26.2. Q&R Functional Organization, may also conduct a complementary review at least every six months. These reviews focus on the site's quality, reliability, failure analysis findings, CCARE, internal audits, supplier performance, follow-up from prior reviews, and progress against the QMS improvement plan.

The site ISO Management Representative tracks actions/decisions made which are treated as quality records.

In many cases the Quality Assurance Quarterly Business Review serves this function.

Q&R tracks agendas, minutes, decisions, actions and/or suggested improvements from these site QMS reviews. These are treated as quality records and stored in PLM as Discussions which are designed for tracking meetings and action items.

11.5. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through scheduled management reviews and the improvement actions they generate.

11.6. Reference Documents – Additional Details

Semtech Document #	Cat	Title
SFBN-4MFN3G	Quality	Corporate Management Review

12. Resource Management / Support

12.1. Training & Development

Semtech established and maintains documented procedures for identifying training needs and provide for the training of all personnel performing activities affecting conformity and product quality. Personnel performing specific assigned tasks are qualified on the basis of appropriate education, training and/or experience.

Each facility maintains a set of procedures for site-specific practices within the standardized training program.

Responsibility for training of Semtech employees is split between the Human Resources Department and the responsible Department Manager. Within this working partnership, they are responsible to provide training or take other actions to achieve the necessary competence, evaluate the effectiveness of the actions taken, ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives, and maintain appropriate records of education, training, skills and experience.

Human Resources is responsible for the following training:

- Initial overview orientation for Hazard Communications, Occupational Safety and Health Program, and ISO 9001 & IATF 16949 Standards.
- Annual ISO 9001 & IATF 16949 Standards training.
- Initial Overview and Orientation of all company Policies and Procedures, as applicable.

Each Department Manager and Area Supervisor is responsible for Certification/Re-certification to detailed area procedures.

Appropriate records of training are maintained at each Semtech location or posted within Cornerstone Learning Management System (LMS). Training records are considered quality records and are maintained either as paper copies or if entered into the LMS, as appropriate.

12.2. Infrastructure

Semtech Chief Executive Officer (CEO) in corroboration and cooperation with his/her Senior Staff determines, provides and maintains the infrastructure needed to achieve conformity to product requirements. Semtech's infrastructure includes the organization, building, workspace, associated utilities, process equipment and support services.

- The functional and departmental infrastructure is defined in Appendix C; Organization Charts. The responsibilities of each department and / or function are described in section 4. Semtech Leadership Team Responsibilities.
- A senior staff member manages each department and / or function. Each senior manager is responsible to provide suitable infrastructure for their department and / or function.

12.3. Work Environment

Semtech determines and manages the appropriate work environment required to achieve conformity to product requirements.

- The work environment consists of the physical property, plant and equipment, the processes in place as well as the collaborative team based work environment that is a part of our company culture and essential to both our past and future success.
- Other references to the work environment are contained within the employee handbook as maintained by the Human Resources department.

12.4. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4JCPZD	Quality	Corporate General Training Procedure
SFBN-4JSS3S	HR	Training: Enrolling in a Course
SFBN-4JZNXH	HR	Training: Attendance Form
SFBN-5BVP23	HR	Resource Management

13. New Product Introduction / Operations

Each business unit exercises extensive control during the definition, development and production release of new standard products and customer specific products. Semtech established a comprehensive set of design control procedures that: a) determines the quality, reliability and performance objectives for new product, b) provides program/project management, resource identification and facilities; c) ensures verification and validation activities; d) provides criteria for acceptability; and, e) clearly defines records that are necessary to provide confidence of conformity of the processes and resulting product.

All business units follow the same new product introduction workflow that consists of 4 phases:

1. Product Definition
2. Product Design
3. Design Validation
4. Qualification

This workflow and record keeping for each phase is managed by PLM Product Portfolio Management (PPM) application utilizing a unique business unit PPM template. The general workflow for all business units is the same; however, each respective business unit defines records kept. The PLM PPM workflow manages, updates and tracks changes to new products as they are designed and prior to being released to production. This includes provisions for the evaluation of changes as well as the verification and validation of changes. The workflows also define the responsibilities and authorities for design and/or development activities.

Key review meetings are held in each phase. Specially designed PLM Discussion application track agendas, minutes, decisions, actions and/or suggested improvements from phase reviews. These are treated as quality records.

Exceptions or clarifications to the typical flow described in this quality manual can be found in the local business unit work procedure.

13.1. Phase 1: Product Definition

Inputs relating to product requirements are defined and documented in the Product Definition Phase. This phase addresses:

- Return on investment analysis.
- Functional and performance requirements in the form of a target datasheet.
- Applicable regulatory and legal product requirements.
- Product requirements not specified by the customer but necessary for intended or specified use.
- Applicable information derived from previous similar designs.
- Other requirements essential for design and/or development.

This Phase contains two critical reviews: NPAW (New Product Approval Worksheet) or Business Case and Product Initiation Review. Participants in these reviews include representatives of each function concerned with the new product design. Results, decisions, and subsequent actions from these reviews are documented and treated as quality records in PLM Discussion application.

The quality records generated during this phase include: defining the design team, a return on investment analysis, block schematic, preliminary part number assignment, draft data sheet, and proposed development schedule.

The return on investment databases are confidential and not subject to customer audits. However, Semtech's 3rd party registrar ensures its compliance and effectiveness.

Authorized personnel review and approve the completion of this phase ensuring that incomplete, ambiguous or conflicting requirements are resolved.

13.2. Phase 2: Product Design

During the Product Design Phase each design team translates requirements defined in Phase 1 into actual product designs. This phase:

- Updates the functional and performance requirements in the form of a preliminary datasheet.
- Determines if the actual design meets the requirements specified in Phase 1.
- Provides appropriate information to production.
- Defines the characteristics of the product that are essential to its safe and proper use.
- Identifies any additional customer requirements together with additional requirements determined by the organization.
- Identifies problems and propose follow-up actions.

This Phase contains four critical reviews: Concept Review, Design Review, Tape Out Review and Engineering Design Release. Participants in these reviews include representatives of each function concerned with the new product design. Results, decisions, and subsequent actions from these reviews are documented and treated as quality records in PLM Discussion application.

The PLM PPM workflow / gate defines the product acceptance criteria. Typical records generated during this phase include: updated schematic (block & transistor level), simulation summary comparison with the preliminary datasheet, design rules, marking diagram, bonding diagram, design evaluation report, application evaluation report, test program and a reliability test plan.

Authorized personnel review and approve the completion of this phase gate.

13.3. Phase 3: Design Validation

This phase validates the performance of first silicon devices to the product requirements. Successful completion of this phase ensures that the new products meet the product performance specifications as previously defined. This phase:

- Updates the functional and performance requirements in the form of a final datasheet.
- Completes all the necessary production documentation needed to enter the qualification phase.
- Prepares marketing and collateral demonstration material.
- Performs customer evaluations.

This phase consists of a critical Pre-Production Release review where a decision is made to release the new product for final qualification. Participants in this review include representatives of each function concerned with the new product design. Results, decisions, and subsequent actions from these reviews are documented and treated as quality records in PLM Discussion application.

Typical Records generated during this phase include: final data sheet, design evaluation report, application evaluation report, operational test program, and updated reliability test plan. Authorized personnel review and approve the completion of this phase gate.

13.4. Phase 4: Qualification

Results from this phase ensure that the new products meet the manufacturability, quality and reliability requirements for new products.

The Product Release Review confirms that all necessary qualification requirements have been met indicating that the device is ready for full production. Participants in this review include representatives of each function concerned with the new product design. Results, decisions, and subsequent actions from these reviews are documented and treated as quality records in PLM PPM Discussion application.

Records generated during this phase include: summaries of Wafer Fab, Probe Yield and Final Test yields; results from the reliability tests performed; ESD capability report; processing work flow; final assembly documentation, approved assembly bill of materials; supplier audits.

NOTE: Qualification plans are Semtech's key preventive action to eliminate the causes of potential nonconformities and to prevent occurrence. The reliability test plan requirements and quality system audits are appropriate to the impact of the potential problems thereby mitigating risk.

Upon approval by authorized personnel, the product is released to production.

13.5. Design Modifications

Design and development modifications are identified and recorded in a PLM PPM Design Modification Records (DMRs). These changes are reviewed, verified, validated and qualified before implementation. Qualification plans for the changes include evaluations of the effect of the changes on products.

13.6. Responsible Function/Business Unit

Business unit managers ensure that their new product introduction procedures are suitable, effective, and compliant to the business needs.

Quality & Reliability oversees the effectiveness of the new product introduction process and ensures its compliance to ISO and other appropriate quality management system standards.

13.7. Reference Documents – Additional Details

Semtech Document #	Cat	Title
SFBN-4U52YJ	Design	New Product Introduction - Design Overview
SFBN-4XTTX4	Quality	Change Management Policies and Procedures

14. Managing Customer Contracts

Semtech acknowledges the need for systematic review of necessary changes that are identified, negotiated, and implemented before deliveries of product or services commence. Such reviews include but are not limited to;

- Customer Non-Standard Part Contracts
- Customer Standard Part Contracts
- Sub-Contractor Facility Contracts

Semtech reviews customer contracts and requirements prior to our commitment to supply product(s). These procedures ensure that:

- Product requirements are clearly defined;
- Contracts or order requirements differing from those previously expressed are resolved; and
- We have confirmed Semtech's ability to meet the defined requirements.

When a product requirement changes, Semtech will raise a "Change Order" (CO) or "Customer Request" (CR) against that document to review and approve changes and ensure that relevant personnel are made aware of the changed requirements.

PLM CR process ensures appropriate communication with customers in relation to product information, inquiries, contracts or order handling, customer feedback and amendments.

When the review of such contracts, agreements, warranties, or guarantees include Semtech's Legal team, the communication to the customer is transferred to them. Such reviews are not open to Semtech's general employee population and therefore, not open to audit by customers. However, Semtech's 3rd party registrar, and Semtech's Corporate Quality Manager ensures its compliance and effectiveness.

Records of these reviews are posted and maintained as quality records in PLM document management system or if applicable Semtech Docket library within the legal department.

14.1. Process Description Overview

Sales and Marketing raises a Customer Request - Document review whenever a customer submits a document to Semtech and requests a formal review, and it cannot be resolved thru the Purchase Order system.

Examples of document types include but are not limited to: quality agreements, purchasing agreements, product specifications, general procurement guidelines and procedures, drawings, terms and conditions, quality system requirements etc.

Customer Request - Document Reviews are initiated prepared and stored in PLM CR application as quality records.

The originator first reviews the documents already in the database to determine if the document was previously reviewed.

If the document was already reviewed and our response is still applicable, then our response is sent to the customer.

If the document was already reviewed and our response is no longer applicable, a new CR is initiated. The document is reviewed again for adequacy.

In general, each document submitted by the customer is treated as separate requests.

14.2. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through timely responses, and flow down instructions to suppliers and business unit engineers when necessary.

14.3. Reference Documents – Additional Details

Semtech Document #	Cat	Title
SEMDOC000724	Quality	Customer Request Process and Procedure
SFBN-53SU7Y	Quality	Reviewing Customer Requirements

15. Documentation and Key Datafile Management

Semtech uses comprehensive on-line Oracle Agile Product Life Cycle based application for document management and key quality system record keeping. These systems provide: document initiation, change control, quality record keeping, review & approval workflows, and archiving as appropriate.

This system application ensures that:

- Documents/quality records are reviewed for adequacy prior to use;
- Documents are reviewed, updated as necessary and re-approved;
- Only the current revision of documents/quality records are available for use;
- Relevant versions of documents/quality records are immediately available to employees;
- Documents/quality records remain legible and readily identifiable;
- Documents of external origin are identified and their distribution controlled;
- Obsolete documents/quality records are archived and identified as INACTIVE or Obsolete to prevent un-intended use; and,
- Documents needed by the corporation to ensure effective planning, operation and control of its processes are available.

PLM Document Management System maintains redundant file servers globally. Here all document and quality processes are stored on redundant servers. In the unlikely event of a system shut down or collapse, PLM back up becomes the primary server with no loss of information, records or approvals.

15.1. Policies

- PLM document management system contains the quality records for document control, quality system and processes.
- All documents printed from PLM are defined to be un-controlled copies.
- Approval loops are defined by the PLM workflow definitions.
- Only authorized personnel such as IT and the PLM Administrator have access to the database definitions, document templates and workflow definitions.
- The unique PLM Workflow approval address stamp assigned during the course of review or approval for QMS processes implemented by a PLM Quality Process application is equivalent to handwritten approval.

15.2. Quality Records

Semtech defines the quality records required by our management system in a series of Quality Records databases.

- Each site requiring a supplemental quality manual maintains the same quality record requirement or has established their own site-specific definitions that are not included in the corporate quality record procedure.
- Additional quality records required by our quality management system and not covered in any site procedure are managed by a corporate Quality Records procedure.

Each site specific quality record procedure may specify: the nature of the records, the record type, storage location and methods for the identification, storage, retrieval, protection, retention time and disposition of quality records.

These records are maintained to provide evidence of conformance to requirements and of effective operation of the quality management system.

The site ISO Management Rep ensures that the combination of the corporate quality record procedure and site quality records procedure address all the quality records requirements.

15.2.1 Policy – Automotive Records

Quality records created in support of the manufacture, inspection or test of automotive grade product shall maintain a life cycle of twenty (20) years (15 years at supplier + 5 years at Semtech).

Quality and Operations are responsible for the maintenance of systems to achieve this requirement.

15.3 Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element.

15.3.1 Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4KWSAP	Quality	Control of Quality Records
PSAZ-5AFUCE	Quality	Standardize Guidelines for Specifications
PSAZ-5AFU9J	Quality	Change Control Procedure

16. Supplier Management

Semtech maintains an extensive supplier management program to develop supplier partnerships based on trust, communication, and objective performance. Our approach is to:

- Ensure all our key suppliers/subcontractors are aware of our quality and reliability requirements;
- Ensure that our key suppliers/subcontractors have quality systems that deliver product that meets or exceed our quality & reliability requirements;
- Objectively measure the performance of foundry subcontractors by structured, defined, and consistent methods;
- Provide feedback to our foundry subcontractors approximately every 6 months.
- Semtech encourages its suppliers to obtain and sustain registration to ISO 9000 standards.
- Semtech encourages its suppliers, that promote automotive processes and provide automotive grade product and services, to obtain and sustain registration to IATF16949.
- Semtech encourages its suppliers to obtain and sustain registration to ISO 140001 or equivalent
- Semtech encourages its suppliers to sustain compliance and promote good business practices and ethical conduct towards its workers pursuant to Semtech's and EICC Code of Conduct requirements, policies and guidelines.

Semtech maintains and develops supplier partnerships with a preferred set of wafer foundry, final test and assembly subcontractors that demonstrate the ability to meet or exceed these requirements or can demonstrate consistent progress towards meeting these expectations.

Semtech defines 4 levels of supplier status for key wafer fab, final test and assembly subcontractors: preferred, qualified, conditionally qualified and dis-qualified.

Semtech's supplier management program ensures our suppliers are evaluated and selected based on their ability to supply product or services that meet or exceed our quality management system, product, or service requirements, industry certifications, policies and guidelines. Criteria for selection and periodic evaluation are defined in the appropriate supplier management specification and the supplier audit checklists.

Each wafer foundry, final test, assembly subcontractor or other key supplier are provided with the appropriate supplier management requirements specification prior to qualification and whenever a major change is made to the performance document.

16.1 Qualification of Wafer Fab Processes

Semtech qualifies wafer fabs, including internal wafer fabs, once they pass a quality management system audit, submit an acceptable process control plan and completing a reliability test plan.

Semtech designs wafer fab qualification requirements as preventive action to eliminate the causes of potential nonconformities and to prevent occurrence. The reliability test plan requirements and quality system audits are appropriate to the impact of the potential problems.

16.2. Policies

- A wafer fab must achieve conditional qualification status prior to shipment of product to our customers.
- Semtech adopted JESD 47 Stress-Test-Driven Qualification of Integrated Circuits specification to guide reliability test plans requirements, test methods and sample sizes.
- Semtech may accept generic data supplied by the wafer fab to satisfy certain environmental tests required in the reliability test plan per JEDEC recommendations.
- Semtech uses ISO 9000 as baseline criteria for the quality management systems audits. Audits also assess the fab's compliance to our internal Wafer Foundry Specification(s) and other industry standard practices as appropriate.
- Approved final reports are the quality records for this QMS element.

16.3. Process Description Overview

Anyone may initiate a Wafer Fab Qualification job using the Rel_Planner database. Once the job is initiated, a Reliability Engineer will prepare a reliability test plan. If appropriate, the reliability test plan will include the requirements for conditional qual. If a quality systems audit is required the Reliability Engineer notifies the appropriate Quality Assurance Engineer.

The Reliability Test Plan (*.pdf file copy) is submitted to the on-line document for review and approval. Once approved, the reliability test plan is scheduled and tracked by the Rel_Planner. At anytime, appropriate personnel may access the Rel_Planner to determine the status and the estimated completion dates.

A change request is generated for the previously approved Reliability Test Plan in our on-line document

control system in order to approve the final report. Upon approval, Q&R changes the qualification status.

16.4. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through a completed reliability & qualification plan.

16.5. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4JCQB8	Quality	Wafer Foundry Supplier Management & Performance Requirements
EIA/JESD 47	Quality	Stress-Test-Driven Qualification of Integrated Circuits

16.6. Qualification of Assembly & Final Test Processes

Semtech qualifies all assembly and final test subcontractors when they pass a quality management system audit, submit and acceptable process control plans and complete a reliability test plan.

Semtech designs assembly subcontractor and final test qualification requirements as preventive action to eliminate the causes of potential nonconformities and to prevent occurrence. The reliability test plan requirements and quality system audits are appropriate to the impact of the potential problems.

16.6.1. Policies

- Assembly and final test subcontractors must achieve conditional qualification status prior to shipment of product to our customers.
- Semtech Corporation follows the environmental tests, and techniques specified in JESD47 Stress-Test-Driven Qualification of Integrated Circuits when qualifying new packages.
- Semtech may accept generic data supplied by the assembly subcontractor to satisfy certain environmental tests required in the reliability test plan per Semtech's Reliability Test Specification.
- Semtech uses ISO 9000 as baseline criteria for the quality management systems audits. Audits also assess the fab's compliance to our internal Subcon Assembly Specification(s) and other industry standard practices as appropriate.
- Approved final reports are the quality records for this QMS element.

16.6.2 Process Description Overview

Anyone may initiate an Assembly and Final Test Subcontractor qualification job using the Rel_Planner database. Once the job is initiated, a Reliability Engineer will prepare a reliability test plan. If appropriate, the reliability test plan will include the requirements for conditional qual. If a quality systems audit is required the Reliability Engineer notifies the appropriate business unit Quality Assurance Manager.

The Reliability Test Plan (*.pdf file copy) is submitted to the on-line document for review and approval. Once approved, the reliability test plan is scheduled and tracked by the Rel_Planner. At anytime, appropriate personnel may access the Rel_Planner to determine the status and the estimated completion dates.

A change request is generated for the previously approved Reliability Test Plan in our on-line document control system in order to approve the final report. Upon approval, Q&R changes the qualification status.

16.6.3 Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through a completed reliability and qualification plan.

16.6.4 Reference Documents – Additional Details

Semtech Document #	Cat	Title
SFBN-4JPT6M	Quality	Assembly Subcon: Assembly Subcontractor Performance Requirements
SFBN-4ZWT2Q	Quality	Final Test Subcontractor Performance Requirements
KFID-4JRLDK	Quality	Reliability and Qualification Test Requirements
JESD 47	Quality	Stress Test Driven Qualification of Integrated Circuits

16.7. Supplier Corrective Action (SCAR)

16.7.1 Policies

Any Semtech employee may raise a **S**upplier **C**orrective **A**ction **R**equest (SCAR) whenever:

- A problem originating from a supplier is severe requires corrective action and tracking until completion;
- Action is needed to eliminate the cause of nonconformities originating from a supplier in order to prevent recurrence;
- One of Semtech's Customer's requires a SCAR from one of our suppliers;
- The results from a failure analysis indicates that the root cause for the device failure is from a supplier;
- A major or minor finding is raised during the course of a surveillance audit.

Information contained in PLM SCAR process are the quality records for this QMS element.

16.7.2. Process Description Overview

Any Semtech employee may raise a SCAR using PLM Quality Change Request by selecting the "Supplier Corrective Action" document type. Once the employee fills out the Problem Description, process, product and supplier information and identifies the affected item, the system will forward the SCAR to the applicable Business Unit Quality Manager for acceptance and assignment of the most appropriate Quality Assurance Manager to manage and drive the supplier to address the problem. Upon acceptance, the assigned Quality Assurance Manager notifies the supplier of the SCAR using the application software to transform the workflow to a .pdf file. He or She coordinates the supplier's and any Semtech resources to address the following 8D problem solving methodology:

- Describing the problem;
- Determining the root cause;
- Determining and implementing containment action if needed;
- Documenting an implementation plan and estimate the completion date;
- Determining actions necessary to prevent recurrence;
- Ensuring the actions and implementation plans are completed in a timely manner suitable to the severity of the request.

The Quality Assurance Manager closes the SCAR once he/she is satisfied that suitable action was taken.

16.7.3. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through timely completion and documentation supporting the SCAR.

16.7.4. Reference Documents – Additional Details

Semtech Document #	Cat	Title
PSAZ-5AMMXS	Quality	Corrective Action, Preventive Action and Continuous Improvement Programs

16.8. Supplier Audits

Semtech audits key suppliers on a regular basis as part of Semtech's risk mitigation ensuring that:

- Their quality systems continue to meet Semtech's requirements;
- Supplier corrective actions or action items were completed as promised;
- They continue to be aware of new Semtech requirements;
- Identified quality issues and corrective actions are deployed throughout Semtech's supplier base.

16.8.1. Process Description Overview

Semtech maintains a PLM Audit Workflow application that manages the Supplier Audit Program.

Quality Assurance prepares and documents audit scope and guidelines in this application with special emphasis on Semtech key requirements. Quality Assurance utilizes the process audit methodology.

Audit scope and guidelines are then assigned to specified audit types. Examples of audit types include qualification and surveillance audits. The application includes features to prepare and document on-demand audits that might be needed as a result of a quality incident.

Finally, Semtech schedules and documents audit results using the same application. Semtech defines 3 finding categories: observation, minor and major. Semtech communicates audit findings in the audit report and raises a SCAR to monitor and track closure.

16.8.2. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through audit scheduling, tracking, performing and documenting audit results.

16.8.3. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4L3S3E	Quality	Corporate Audit Program
SFBN-4JPT6M	Quality	Assembly Subcon: Assembly Subcontractor Performance Requirements
SFBN-4ZWT2Q	Quality	Final Test: Final Test Subcontractor Performance Requirements
KFID-4JCQB8	Quality	Wafer Fab: Wafer Foundry Supplier Performance Requirements

16.9. Supplier Report Cards

Semtech monitors key wafer foundries, final test, assembly subcontractors, and other key company-wide suppliers. On a quarterly basis, Semtech reviews key supplier data and prepares a report card for each supplier.

The goal of these report cards is to: establish criteria for rewarding top suppliers with additional work; identify areas of weaknesses where corrective action is warranted; influence the frequency, areas and level of detail for surveillance audits as part of Semtech's risk assessment.

Typical Score Card criteria include:

- Commitment to the appropriate supplier management requirements specification;
- Findings from surveillance audits;
- Supplier Corrective Action Response Times;
- Number & Severity of Quality Incidents;
- C_p and C_{pk} Reports;
- Process Change Notifications;
- On-going Reliability Monitoring;
- Outgoing Quality.

16.9.1. Policies

Each local site may find it appropriate to monitor additional suppliers. In those situations, the site key suppliers shall be named along with supporting procedural documentation.

16.9.2. Process Description Overview

Semtech maintains a PLM document application for Supplier Report Cards where report cards are created, scored, reviewed and approved.

Quality Assurance initiates a report card for each critical supplier on a quarterly basis. Quality Assurance and Operations scores the supplier in key areas. Each scorecard is reviewed and approved by Operations and Quality's senior management. Once approved, Quality Assurance issues the scorecard to the supplier directly from the application.

If appropriate, Quality Assurance raises a SCAR to address a weakness identified in the scorecard.

16.9.3. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through assessing risk and generating actions for continual improvement.

16.9.4. Reference Documents–Additional Details

Semtech Document #	Cat	Title
SFBN-4JPT6M	Quality	Assembly Subcon: Assembly Subcontractor Performance Requirements
SFBN-4ZWT2Q	Quality	Final Test: Final Test Subcontractor Performance Requirements
KFID-4JCQB8	Quality	Wafer Fab: Wafer Foundry Supplier Performance Requirements

17. Anti-Counterfeit Program / Risk Assessment & Risk Mitigation Focus

Semtech Corporation has adopted a 'zero tolerance policy' against any person, group, agency or entity who knowingly and intentionally traffic counterfeit parts.

The purpose of this Anti-Counterfeit Policy to eliminate the impact of counterfeit products upon Semtech, its subsidiaries, suppliers, distributors and its customers. And to prevent the misappriopriation or diversion of technology, designs, software, or confidential information against the unauthorized manufacture, or sale of customer components, assemblies, systems, or software.

To support this program of ensuring that there is a low risk of counterfeit products entering our supply chain from customer returns, request for failure analysis or offshore warehouses for product exchanges due to old date codes or package deterioration. Semtech Corporation maintains processes to ensure our customers purchase, order or request a quote for Semtech products are only made directly to Semtech Corporation or through one of our franchised distributors to our sales team.

This is accomplished pursuant to Semtech established and controlled procedures,

Should a suspect counterfeit or counterfeit product be detected, Semtech Corporation shall quarantine such material and report the finding to the applicable Semtech customer, distributor, Semtech's qualified supplier base and appropriate authorities. This policy shall be communicated, understood, implemented, and maintained at all levels within Semtech Corporation.

17.1. Counterfeit Avoidance

Semtech Corporation recognizes the need to prevent counterfeit (CF) parts from being used in our products and has implemented this policy and procedure in accordance with ISO 9001, AS9100, IATF16949 systems consistent with SAE AS6496 as follows:

- Maximize availability of authentic Semtech product throughout product lifecycle (anticipate and manage obsolescence)
- Establish preference to utilize qualified suppliers who's quality management system is certified by an accredited registration body. And where applicable, qualified through Semtech's Reliability group.
- Conduct business in the sale of Semtech product with one of our 'franchised' distributors who maintain a contract or agreement with Semtech Corporation
- Flow down quality requirements to Semtech suppliers as defined by customer contract, agreement or purchase order
- Detect CF parts through incoming inspection
- Detect, verify, contain and control CF parts after initial Receiving Inspection
- Contain and control suspected or confirmed CF parts to prevent re-entry into supply chain
- Report CF parts to Semtech business and relevant internal stake holders, suppliers, distributors, customers, and other authorities

17.2. Finished Goods vs Counterfeit Parts

17.2.1. "Finished Goods"

Finished Goods consists of Semtech product or parts delivered that are the lowest level of separately identifiable items (e.g., articles, components, assembly hardware, evaluation kits, and assemblies).

17.2.2. "Counterfeit Parts"

Semtech defines counterfeit parts as;

a). Parts that are, or contains, items misrepresented as having been designed and\or produced under an approved system or other acceptable method.

b). Parts that are an unauthorized copy or substitute of Semtech Corporation's product design.

c). Parts that are not traceable to an Semtech Corporation and not sufficient to ensure authenticity in accordance with Semtech's design.

d). Parts that do not contain proper external or internal materials or components required by Semtech Corporation or are not constructed in accordance with Semtech's design.

e). Parts that have been re-worked, re-labeled, repaired, refurbished as Semtech product.

f). Parts that have not passed successfully all of Semtech's required testing, verification, screening, and quality control processes.

17.3. Contain & Control

Semtech and its suppliers shall establish and maintain processes to detect, and verify Counterfeit Parts\Material Prevention and contain and control such parts and material to ensure that counterfeit parts and material are not re-introduced into Semtech's supply chain or delivered to customers or received from a non-franchised source.

All returned material must be accompanied with a Return Material Authorization (RMA) number issued by Semtech's sales group through SAP. Prior to the issuance of an RMA, the sales group shall verify the customer or distributor, review sales history and validate the lot number(s), date code(s) and quantities shipped. If there any discrepancies, an RMA is not issued and the request is considered suspect. The matter is escalated to the Sales Account Manager, business unit quality manager and local site operations.

When product or material arrives without an official and authentic RMA, the return is considered suspect and must quarantined. Site Quality Manager and Operations shall investigate and examine the accompanying paper work, evaluate a sample of the return through X-Ray or

bench test, marking comparison to existing approved documentation. Any discrepancies, the product or material is considered counterfeit.

Once there is no further need of the CF Parts or material, they are dispositioned pursuant to Semtech procedure, SFBN-4LZMC4 Non-Conforming Material Request & Material Review Board. At the conclusion of the disposition the CF Parts and material are destroyed by crushing, melting or by the best industry practice and then disposed of in a reclamation barrel. It is also best practice to generate a Certificate of Destruction. Forward a copy of the COD to the initial requesting entity who sent the CF Parts.

17.4. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element. Effectiveness is measured by the number of reportable incidences.

17.5. Reference Documents–Additional Details

Semtech Document #	Cat	Title
SEMDOC004908	Quality	Anti-Counterfeit Program

18. Purchasing

Semtech Corporation maintains a purchasing department at each facility that procures materials used in the manufacture of Semtech products.

18.1 Purchasing Control Information

Purchasing control is accomplished by requiring various approvals on any purchase order placed for procurement. Minimum signature approvals include the department head, engineering, and the purchasing agent. All production materials are purchased to specific part drawings that are generated and maintained by Semtech Corporation personnel. Orders are placed to a drawing number and revision level controlled. The latest revision of Semtech Corporation drawings is provided to the vendor with each purchase order. Vendors must be qualified and listed within the Qualified Suppliers Listing in PLM before orders are placed.

For those products that are off-the-shelf commercial products, part number references suffice and are the responsibility of the vendor.

18.2. Purchasing Information

Purchasing information is maintained in Semtech's ERP, SAP for a minimum of 5 years. Traceability includes specific vendors, dates, quantities, delivery points, and pricing. Inspection results are recorded on Receiving Inspection Reports (RIR's), travelers, or other reporting media and filed by Quality Assurance personnel. Retention is again a minimum of 5 years unless customer requirements include a longer retention period.

18.2.1. Verification of Purchased Product

All materials shipped to Semtech manufacturing facilities for use in manufactured products are subject to an inspection upon receipt at their point of delivery. Quality Assurance personnel carry out the required inspections and the results of said inspections are recorded as quality records and retained at the receiving facility. These quality records are maintained by specific part number and by specific vendor for a minimum period of 5 years. Semtech reserves the right to inspect procured materials at their site of manufacture when necessary.

18.2.2. Control of Production & Service

Semtech and its manufacturing facilities, and suppliers plan and carry out production and service requirements under controlled conditions. These controlled conditions include, as applicable,

- the availability of information that describes the characteristics of the product,
- the availability of work instructions, as necessary,
- the use of suitable equipment,
- the availability and use of monitoring and measuring equipment,
- the implementation of monitoring and measurement, and
- the implementation of product release, delivery and post-delivery activities

18.2.3. Validation of Processes for Production & Service

Semtech Corporation outsources much of its fabrication, assembly and test processes. Within this business model, Semtech's engineering, operations and quality teams validates these processes used in production and service. This validation demonstrates the ability of those processes to achieve planned results. These teams establish and review, as applicable,

- Define criteria for review and approval of these processes,

- Approval of equipment and qualification of personnel,
- Use of specific methods and procedures,
- Control of records, and
- revalidation

18.2.4. Reference Documents –Additional Details

Each Semtech facility requiring a quality manual supplement maintains their own procedures for purchasing these materials using the Corporate Purchasing Procedure as a basis for those documents.

Semtech Document #	Cat	Title
KFID-4KDLKB	Ops	Purchasing Procedure
KFID-4MEPGU	Quality	Qualified Suppliers List

19. Managing Non-Conforming Material

Semtech Corporation maintains a worldwide **N**on-**C**onforming **M**aterial **R**equest system (NCMR) driven by PLM Document Management System. This system ensures that product which does not conform to requirements is identified and controlled to prevent unintended use or delivery as part of Semtech's risk assessment & mitigation.

Nonconforming product is corrected and subject to re-verification after correction to demonstrate conformity per the direction of the Material Review Board (MRB.)

When nonconforming product is detected after delivery or use has started, the Material Review Board specifies appropriate action such as reporting for concession to the customer, the end-user, regulatory body or other body.

19.1. Policies

A NCMR is generated whenever it is determined that:

- Finished product(s) does not meet Semtech datasheets or customer specified requirements, or were not manufactured, inspected or tested to the process of record.
- Work-in-process does not meet internal specifications; or were not manufactured, inspected or tested to the process of record.
- An external wafer foundry requests a concession from Semtech specifications prior to shipment;
- An assembly subcontractor requests a concession from Semtech prior to shipment.
- A Logistical RMA is generated through the CCARE system tracked through SAP where the customer returns product to Semtech. A NCMR must be generated and the material dispositioned prior to any re-stocking, re-work or re-shipment activity.
- A Maverick Lot has occurred at either an internal wafer fab, external wafer foundry or an assembly subcontractor.
- A QPL Failure has occurred and the failures were determined to be non-discountable.
- Quality & Reliability suspects product, or work in process are not conforming to Semtech datasheets, customer specified requirements or were not manufactured, inspected or tested to the process of record.

19.2. Process Description Overview

Any Semtech employee may initiate a Non-Conforming Material Request. Once entered in PLM system, the system forwards the NCMR to the specified Quality Manager based on business unit and product affected.

- The Quality Manager, who also serves as the Material Review Board Chair (MRB Chair) for the NCMR type.
- The MRB Chair selects the most appropriate Material Review Board Members for the NCMR type.
- A Quality Assurance professional is always included in each MRB.

The Chair solicits disposition recommendations from the MRB Board. After reviewing the recommendations, the Chair selects the most appropriate disposition action and asks the MRB for final approval. If the MRB cannot agree on a course of action, the NCMR is escalated to Q&R Management for final disposition.

19.3. Customer Agreements – Special Circumstances

Under certain customer agreements, product dispositioned by NCMR require customer approval prior to shipment. Quality Assurance and Operations are responsible for proper product containment and pursuit of customer approval under these circumstances.

19.4. Supporting Processes

The NCMR process allows for the creation and tracking of CAR8Ds or other applicable PLM process such as Discussions, PCNs, Waivers, etc.

19.5. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through sustaining an average time to close at 30 days or less, or timely completion of supporting corrective actions.

19.6. Reference Documents–Additional Details

Semtech Document #	Cat	Title
SFBN-4LZMC4	Quality	Non-conforming Material Request (NCMR) and Material Review Board (MRB) Processes

20. Manufacturing and Operations Controls

Semtech assures that each product is manufactured to the datasheet specifications whether it is manufactured internally or externally. These datasheets describes the characteristics of our products.

Semtech demands from each wafer fab, wafer probe, assembly and final test site that:

- They manufacture or test Semtech product according to a lot traveler or equivalent.
- They have documented procedures (work instructions) defining each processing step for the traveler, or equivalent.
- Personnel performing the work are qualified.
- They have documented procedures specifying criteria for workmanship at key inspection/testing and or assessment points.
- Appropriate monitoring and measuring devices as specified in the lot traveler or equivalent.
- Out-of-control action plans are defined implemented at key processing steps.
- Key equipment is qualified prior to use and monitored to assure its suitability.
- They implemented an appropriate preventative maintenance program.
- Final Test and wafer probe equipment are routinely calibrated.
- Products are final tested prior to release for customer delivery.

Lot travelers or equivalent define the processing steps where statistical techniques are needed to control and verify process capability and product characteristics. Each manufacturing site maintains procedures describing the methods to implement and control the application of statistical methods identified in Lot travelers.

These policies are assured as each Semtech site has a QMS compliant to ISO 9001 & IATF 16949. Their implementation and effectiveness is monitored during regular internal audits.

Semtech evaluates key suppliers during our supplier qualification process. Semtech expects that key suppliers have quality systems compliant to ISO 9000, ISO 14001, IATF 16949 or demonstrate equivalent. Their continued implementation and certification is monitored during surveilla8.5.3nce audits.

20.1. Reference Documents – Additional Details

Documentation for Semtech manufacturing sites is specified in the site Quality Manual Supplement.

20.2. Product Identification & Traceability

Semtech identifies each product with a unique part number. Semtech provides specific labeling and marking instructions to our final assembly and test sites.

During production, Semtech established the following unique traceability policies and procedures:

- **Wafer Lot Number:** Each Wafer lot is started in production with a unique lot number that is listed on the wafer lot traveler. The Wafer lot number accompanies the wafer lot thru wafer probe.
- **Assembly Lot Number:** Our assembly subcontractors create unique Assembly Lot numbers during the packaging processes. One wafer lot may yield multiple assembly lot numbers. These numbers are listed on the assembly lot travelers.

The combination of part number, wafer lot number, and assembly lot number provide the identification and traceability requirements demanded by us, our customers and ISO 9001 & IATF 16949, and IATF 16949 QMS requirements.

20.3. Handling, Storage, Packaging, Preservation & Delivery

Semtech established and maintains documented procedures for handling, storage, packaging, preservation and delivery of product throughout the manufacturing cycle. These procedures provide the methods that prevent damage or deterioration of our products. Wherever practical, Semtech adopts accepted industry standards.

Semtech also has designated storage areas or stock rooms to prevent damage or deterioration of product, pending use or delivery. Appropriate methods for authorizing receipt and the dispatch to and from such areas are documented.

In order to detect deterioration, the condition of product in stock is assessed at appropriate intervals.

20.4. Customer Property

Semtech Corporation does not accept/work with or uses customer property or customer owned equipment. Semtech utilizes its qualified supplier group to perform fab, assembly, test functions. Semtech excludes ISO 9001 section 8.5.3 and IATF 16949 requirements for Customer Property in our QMS.

Additionally, Semtech Corporation does not consider material returned for failure analysis (FA) or Return Material Authorization (RMA) as customer property defined in section 8.5.3 of ISO 9000. FA often results in a destructive analysis or under RMA credit or replacements are sent.

21. Measurement, Analysis and Improvement & Performance Evaluation

Semtech has implemented measurement, analysis and improvement processes supporting Performance Evaluation where needed;

- To demonstrate conformity to product requirements,
- To ensure conformity of the QMS,
- To continually improve the effectiveness of the quality management system.

Such processes are planned and exist within our internal Audit program.

21.1 Customer Satisfaction

Semtech continuously works on improving its QMS, product and processes to enhance customer satisfaction. As part of monitoring and measuring customer satisfaction, Semtech monitors information relating to customer perception to determine if we meet customer requirements. Such methods include;

- Design wins and losses
- CCare / RMA returns
- Customer Report Cards
- Customer audits and their findings
- Quality incidences, Alerts, and Recalls
- Customer Satisfaction Surveys

21.2. Internal Audits

21.2.1. Policies

Semtech conducts periodic internal audits to determine whether the QMS conforms to ISO 9001 & IATF 16949; policies and procedures defined by this quality standard and other planned arrangements as part of Semtech's risk assessment and risk management methodology. Additionally, if the site is certified or undergoing certification for IATF 16949, ISO 14001, OHSAS 18001 or any other industry recognized standard, then those elements / clauses are included in the Internal Audit program respectively. These audits ensure our quality management system has been effectively implemented, maintained and provide feedback to Semtech Management for them to drive continuous improvement of their business processes.

Semtech Corporation's internal audit program applies to the business processes deployed corporate wide. For any audit performed at any corporate site fulfills the annual audit requirement as specified herein.

The Management Representative of each named Semtech site:

- Plans an audit program for those areas and processes unique to their site operation taking into consideration the status and importance of the activities to be audited as well as the results of the previous audits;
- Implements and maintains an internal audit process application addressing those unique areas and processes;
- Defines the audit scope, frequency and audit methodologies for those local site audits;
- Ensure personnel other than those who perform the activity being audited conduct audits.

For Semtech Sites without a named ISO Management Rep, the Corporate ISO Management Rep shall ensure an appropriate audit program. For business processes implemented and maintained using an established workflow application such as PLM, SAP, Cornerstone LMS, Sales Force, or any other business unit, operations, quality, finance or sales system, certain audits for remotes sites are performed on the quality records contained within those systems.

21.2.2. Process Description Overview

Quality Assurance creates and maintains audit criteria in a series of process audit scopes and guidelines in the PLM Audit Workflow application. Semtech's process audits do not maintain a standardized audit

checklist in the sense of the word. The so-called checklists identify the applicable clauses associated with the particular process audit. These clauses embody the full breadth and depth of ISO 9001 & IATF 16949, business processes defined by this quality manual, key customer requirement, and other industry standard practices. These checklists contain methods for scoring the results of audits.

Checklists are then assigned to audit workflows. Audit workflows take into consideration the status, importance, and the results of previous audits. The audit workflow provides the capability to add ad hoc checklists and/or audit workflows as may be needed.

Quality Assurance schedules audits by area, department or business processes using the application program. Each audit is assigned an audit workflow. Audits are generally scheduled at least one calendar quarter in advance.

Auditors are assigned to ensure objectivity and impartiality of the audit process. Auditors do not audit their own work.

Results and scoring of the audits are recorded within the audit workflow.

Quality Assurance raises an internal audit corrective action for appropriate findings. Corrective actions are created separately in PLM Quality Change Request, them identified in the Relationship tab of the Audit workflow. The corrective action system then manages the actions taken to address the finding as well as verification of corrective action effectiveness. If an audit detects suspected non-conforming material, then a non-conforming material request (NCMR) would be raised. The NCMR system then manages the review and disposition of suspect material. The NCMR is identified within the Relationship tab of the Audit Workflow. If appropriate a corrective action may be raised as well.

21.3. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through audit scheduling, tracking, performing and documenting audit results.

21.4. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4L3S3E	Quality	Corporate Audit Program

21.5. Calibration

Semtech identifies and calibrates appropriate equipment needed to assure conformity of product to requirements as part of Semtech's risk management and mitigation.

For each site where there is a named Site ISO Management Representative prepares and maintains a calibration work procedure compliant to ISO 9001 & IATF 16949 requirements and where applicable IATF 16949. The Corporate ISO Management Rep addresses sites without a name ISO Management Rep.

Semtech uses calibration techniques that are traceable to international or national standards. If no standards exist each site documents the basis used for calibration.

Calibration records are stored in the appropriate site-tracking database.

The calibration work procedure includes re-call provisions should equipment be found out of calibration.

21.5.1. Policies

Each site ensures work procedures for equipment requiring calibration address:

- Ensure appropriate equipment are calibrated or adjusted prior to use;
- Safeguarding equipment from adjustments that would invalidate the calibration;
- Protecting equipment from damage and deterioration during handling, maintenance and storage.

For sites with a Supplemental Site Quality Manual requirement, such calibration documentation shall be listed in their appropriate section.

21.6. Responsible Function/Business Unit

- Quality & Reliability ensures the effectiveness of this QMS element through sustaining current and up to date calibration cycles.

21.7. Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4KGKRU	Quality	Calibration Procedure
PSAZ-5AMV6Y	Quality	Calibration Record - Form

21.8. On-Going Reliability Testing

Semtech has an extensive On-going Reliability Testing Program. Reliability Assurance classifies wafer fab process families for the purposes of selecting sampling plans; reporting reliability tests; and, reporting reliability statistics as part of Semtech's risk management and risk assessment methodologies.

The classifications take into consideration processing technologies, minimum spacing geometries, dielectric passivation techniques, number of metal inter connect levels and wafer fab site and assembly sites.

Product samples are drawn per the procedure listed below on a regular basis in order to demonstrate to us and our customers FIT levels <10 for all major process groups. Special emphasis is placed on newly qualified or immature processes.

The ORT program includes the following environmental tests:

- High Temperature Operating Life
- Highly Accelerated Stress Testing
- Autoclave
- Temperature cycling

The program includes requirements for our assembly subcontractors to participate in our ORT program.

Testing procedures and methods are performed according to the appropriate JEDEC specifications and are only performed by qualified personnel.

A reliability test plan is prepared for each ORT event. The initial report and the final report are the quality records for this QMS. Results from each ORT test are incorporated into our Reliability Statistics databases for tracking and reporting purposes.

Our ORT addresses the ISO 9001 and where applicable IATF 16949 requirement to re-validate processes where the resulting output cannot be verified by subsequent measurement or monitoring. The environmental reliability testing addresses wafer fab and assembly processes where deficiencies may become apparent only after the product is in use.

21.9. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through documenting ORT results and reporting in management reviews.

21.10. Reference Documents – Additional Details

Semtech Document #	Cat	Title
GSAN-4MFNM4	Quality	Reliability Test Requirements for ORT
JESD-47	Quality	Stress – Test – Driven Qualification of Integrated Circuits

22. Corrective Action Request System (CAR8D) & Improvement

22.1 Corrective Action Program Policies

As part of Semtech's risk management and risk mitigation methodologies, any Semtech employee may raise an internal **C**orrective **A**ction **R**equest using the **8D** problem solving method whenever:

- Action needs to be tracked until completion;
- Action is needed to eliminate the cause of nonconformities in order to prevent recurrence;
- A non-compliant issue involving ISO 9001 or IATF 16949, ISO 14001, OHSAS 18001 standards;
- Safety issue or concern;
- There is a major or minor finding during an internal audit.

Information and records contained in PLM Quality Change Request system are the quality records for this QMS element.

22.2. Process Description Overview

Any Semtech employee may initiate CAR8D using PLM Quality Change Request system, CAR workflow. The initiator describes the problem, identifies the affected items, identifies relationships to other Quality processes, and attaches supporting documentation if applicable and sends it to the appropriate Quality Assurance Manager (or QA Staff Member) based on business unit and product affected. The Quality Assurance Manager reviews each submission and assigns a Driver. The Driver coordinates Semtech resources by addressing the corrective action request using PLM Quality Change Request application by:

- Reviewing and interpreting the problem;
- Determining the root cause;
- Determining and implementing containment action if needed;
- Documenting an implementation plan and estimate the completion date;
- Determining actions necessary to prevent recurrence;
- Conducting a risk assessment, if necessary;

- Ensuring the actions and implementation plans are completed in a timely manner suitable to the severity of the request.

Quality Assurance Manager may escalate corrective action request whenever timely actions are not evident. When the Driver is satisfied that the appropriate corrective action was taken, he/she forwards the document for closure review. The Closure Review team consists of at least the assigned Quality Assurance Manager and the Originator.

Once approved, the document is marked for an effectiveness audit to be performed within 90 to 120 days by Quality Assurance.

The CAR8D is formally closed after a successful effectiveness audit.

22.3. Responsible Function/Business Unit

Quality & Reliability ensures the effectiveness of this QMS element through timely completion and lack of reoccurrence.

22.4. Reference Documents – Additional Details

Semtech Document #	Cat	Title
PSAZ-5AMMXS	Quality	Corrective Action, Preventive Action and Continuous Improvement Programs

23. Preventive Action & Improvement

23.1. Preventive Action Request Program

Semtech strives to identify quality practices, processes and quality systems in support of preventive action initiatives to include product qualification process geared to eliminate or as a minimum significantly reduce recurring non-conformances in material, product, services or the development of practices outside the guidelines of corporate directives and policies as a measure of preventive action.

Preventive Action as a tool is part of our quality system as a proactive measure to eliminate or reduce the occurrences of nonconformity and non-compliance and also serves as a measure of continuous improvement.

Such measures are found in;

- Internal Audit and Supplier Audit Program
- Daily Ongoing Reliability Testing conducted at our subcontractors
- Semtech's ORT program administered by our reliability group
- Semtech's Shift Analysis program
- Semtech's qualification process as identified in our New Product Introduction program
- Generation of FMEAs and OCAPs
- The review of Statistical Process Control data, Process Control Measurement data and Key Product Indicators
- The review of data and information within our quality systems and the change control processes defined for gaining approval
- Device Profile modeling
- T Supreme Dopant & Epi Measurement tool
- Yield Enhancement Programs
- Test Program Transfers
- Change Management process
- Subcontractor qualification program
- Measuring Subcontractor Performance as identified within our Supplier Quality Management Program
- Calibration Program
- Management Review Programs
- Preventive Maintenance Program
- Verification audits pursuant to Corrective Action Response
- Environmental Objectives and Targets
- Environmental Aspects and Impact assessments
- Health and Safety programs
- Programs and laws governing business ethics, codes of conduct

The measures listed are a sampling of those areas whereby preventive action is part of the goal or process supporting Semtech's risk management and risk assessment methodologies. The list is not all inclusive but should serve as a basis of information.

Additionally, Semtech performs extensive qualification work prior to the release of products to our customers. These qualification activities eliminate the cause(s) of potential nonconformities and is our prime preventive action as required by ISO 9001 & IATF 16949.

Documents referenced within JESD 47 Stress-Test-Driven Qualification of Integrated Circuits identify potential nonconformities and their causes. Semtech adopted JESD 47 Stress-Test-Driven Qualification of

Integrated Circuits specification to guide qualification plan requirements, test methods and sample sizes.

Quality & Reliability approves all qualification plans. This ensures that qualification requirements and/tests are appropriate to the impact of potential problems.

Upon completion of the qualification requirements, Q&R approves a final report. These final reports document the results of the qualification requirements/tests, exceptions, and any action taken as appropriate.

The initial qualification plan and the final report are the quality records for this QMS.

NOTE: Each qualification plan includes provisions to perform certain environmental testing assessing the reliability of our devices. These reliability tests address the ISO 9001 and where applicable IATF 16949 requirement to perform validation tests on processes where the resulting output cannot be verified by subsequent measurement or monitoring.

23.2. Reference Documents –Additional Details

Semtech Document #	Cat	Title
PSAZ-5AMMXS	Quality	Corrective Action, Preventive Action and Continuous Improvement Programs
KFID-4JRLDK	Quality	Reliability Test Requirements for Product / Process / Package Change Qualification, Automotive (AEC), and Ongoing Reliability Testing (ORT)
JESD-47	Quality	Stress – Test – Driven Qualification of Integrated Circuits

23.3. Process Control Plans

23.3.1. Policies

- Process control plans are generated for each major wafer fab, assembly subcontractor or other key supplier at time of qualification.
- Process Control Plans are stored in PLM Supplier Documents application and are placed under revision control.
- Process Control Plans identify preventive, monitoring, out of control action plans and the statistical methods used to measure and monitor manufacturing processes.

23.3.2. Responsible Function/Business Unit

- Each site where manufacturing is being conducted, the site quality manager prepares a list of processes requiring Process Control Plans.
- Process or Manufacturing Engineering at each site prepares and submits process control plans for review and approval.
- Semtech's Q&R Supplier Quality Assurance Engineer prepares list(s) of processes requiring process control plans from our wafer fabs, assembly subcontractors and other key suppliers. He/she also coordinates activities to obtain control plans during qualification.

The Process Control Plans, once obtained or created, are maintained within PLM Supplier Documents application.

23.3.3 Reference Documents – Additional Details

Semtech Document #	Cat	Title
KFID-4JRLDK	Quality	Reliability Test Requirements for Product / Process / Package Change Qualification, Automotive (AEC), and Ongoing Reliability Testing (ORT)
GSTD-4KE54M	Quality	Process Control Plan Requirements

24. Appendix A: Semtech Sites Requiring Quality Manual Supplements

Semtech Sites that need to have Quality Manual Supplements are defined in: Table 1 Sites Requiring Supplemental Quality Manuals. The Supplements are prepared and maintained by the site ISO Management Representative.

Semtech sites identified as maintaining an Integrated Management System (IMS) utilizes a single quality manual incorporating multiple industry standards such as ISO 9001, ISO 14001, and OHSAS 18001.

Table 1 Sites Requiring Supplemental Quality Manuals

Burlington, Canada (IMS) and remote sites identified in IMS manual
Reynosa, Mexico
Neuchatel, Switzerland
Irvine, California

25. Appendix B: Site Application of QMS Process

This appendix defines the QMS processes application by Semtech site.

Table 2 Site Application of QMS Process

Quality Management System Element	Camarillo, CA	San Jose, CA	San Diego, CA	Morrisville, NC	Reynosa, Mexico	Southampton, UK	Neuchatel, Switzerland	Irvine, CA	Plano, TX	Burlington, Canada	Semtech Canada Corporation Design Sites
1. Quality Management System Overview	X	X	X	X	X	X	X	X	X	X	X
1.1 QMS Process & Sequence	X	X	X	X	X	X	X	X	X	X	X
1.2 Quality Management System Policies	X	X	X	X	X	X	X	X	X	X	X
1.3 Scope of Management Systems	X	X	X	X	X	X	X	X	X	X	X
1.4 Quality Manual Policies	X	X	X	X	X	X	X	X	X	X	X
1.5 Control of Documents	X	X	X	X	X	X	X	X	X	X	X
1.11 Control of Quality Records	X	X	X	X	X	X	X	X	X	X	X
1.13 Semtech Knowledge	X	X	X	X	X	X	X	X	X	X	X
2. Risk Management	X	X	X	X	X	X	X	X	X	X	X
3. Context of the Organization	X	X	X	X	X	X	X	X	X	X	X
3.5 Semtech's Competition	X	X	X	X	X	X	X	X	X	X	X
3.6 Interested Parties	X	X	X	X	X	X	X	X	X	X	X
4. Core Values	X	X	X	X	X	X	X	X	X	X	X
5. Quality Policy / Leadership Focus	X	X	X	X	X	X	X	X	X	X	X
5.1 Achieving Semtech's Goals / Planning Focus	X	X	X	X	X	X	X	X	X	X	X

Quality Management System Element	Camarillo, CA	San Jose, CA	San Diego, CA	Morrisville, NC	Reynosa, Mexico	Southampton, UK	Neuchatel, Switzerland	Irvine, CA	Plano, TX	Burlington, Canada	Semtech Canada Corporation Design Sites
6. Semtech's Leadership Team Commitment and Responsibilities / Leadership	X	X	X	X	X	X	X	X	X	X	X
6.1. Most Important Tasks (MITs)	X	X	X	X	X	X	X	X	X	X	X
6.2. Department Roles & Responsibilities / Leadership Focus	X	X	X	X	X	X	X	X	X	X	X
6.3. Business Unit Manager's Roles & Responsibilities / Leadership Focus	X	X	X	X	X	X	X	X	X	X	X
7. Management Representative(s)	X				X		X		X	X	
8. QMS Continuous Improvement / Planning	X				X		X			X	
9. Customer Focus	X				X		X		X	X	
9.1. Customer Care	X				X		X		X	X	BRSTL
9.4. Customer Requirements Review	X	X	X	X	X	X	X		X	X	X
9.5. Customer Notifications	X				X		X		X	X	BRSTL
9.5.1.1 Policy – Automotive Product	X								X		
9.6 Failure Analysis	X				X		X		X	X	BRSTL
10. Quality Planning / Operations & Planning Focus					X		X	X		X	
11. Management Review / Performance Evaluation	X	X	X	X	X	X	X	X	X	X	X
11.1 QMS Continuous Improvement / Improvement and Performance Focus	X	X	X	X	X	X	X	X	X	X	X
11.2 Quarterly Business Reviews	X	X	X	X	X	X	X	X	X	X	X
11.4 Site QMS Reviews	X				X		X	X		X	

Quality Management System Element	Camarillo, CA	San Jose, CA	San Diego, CA	Morrisville, NC	Reynosa, Mexico	Southampton, UK	Neuchatel, Switzerland	Irvine, CA	Plano, TX	Burlington, Canada	Semtech Canada Corporation Design Sites
12. Resource Management / Support	X				X		X	X		X	
12.1 Training and Development	X	X	X	X	X	X	X	X	X	X	X
12.2 Infrastructure	X				X		X	X		X	
12.3 Work Environment	X				X		X	X		X	
13. New Product Introduction / Operations	X	X	X	X	X	X	X		X	X	X
13.1. Phase 1: Product Definition	X	X	X	X	X	X	X		X	X	X
13.2. Phase 2: Product Design	X	X	X	X	X	X	X		X	X	X
13.3. Phase 3: Design Validation	X	X	X	X	X	X	X		X	X	X
13.4. Phase 4: Qualification	X	X	X	X	X	X	X		X	X	X
13.5. Design Modifications	X	X	X	X	X	X	X		X	X	X
14. Managing Customer Contracts	X				X		X			X	
15. Documentation and Key Datafile Management	X	X	X	X	X	X	X	X	X	X	X
15.2. Quality Records	X	X	X	X	X	X	X	X	X	X	X
15.2.1 Policy – Automotive Records	X								X		
16. Supplier Management	X				X					X	
16.1. Qualification of Wafer Fab Processes	X				X					X	
16.6 Qualification of Assembly & Final Test Processes	X				X					X	
16.7 Supplier Corrective Action (SCAR)	X				X		X			X	
16.8 Supplier Audits	X				X					X	

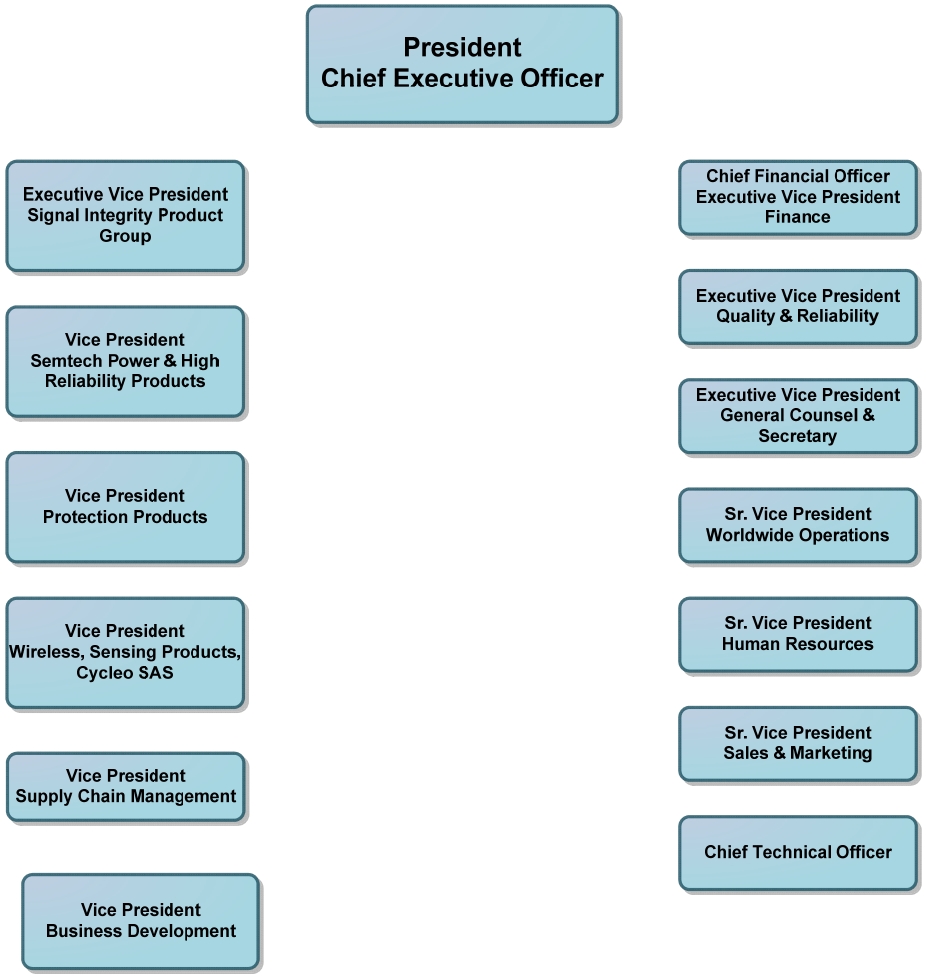
Quality Management System Element	Camarillo, CA	San Jose, CA	San Diego, CA	Morrisville, NC	Reynosa, Mexico	Southampton, UK	Neuchatel, Switzerland	Irvine, CA	Plano, TX	Burlington, Canada	Semtech Canada Corporation Design Sites
16.9 Supplier Report Cards	X										
17. Anti-Counterfeit Program / Risk Assessment & Risk Mitigation Focus	X	X	X	X	X	X	X	X	X	X	X
17.1 Counterfeit Avoidance	X	X	X	X	X	X	X	X	X	X	X
18. Purchasing	X	X	X	X	X	X	X	X	X	X	X
18.1 Purchasing Control Information	X	X	X	X	X	X	X	X	X	X	X
18.2 Purchasing Information	X	X	X	X	X	X	X	X	X	X	X
18.2.2 Control of Production and Service	X				X		X			X	
18.2.3 Validation of Processes for Production and Service	X				X		X			X	
19. Managing Non-Conforming Material					X		X	X		X	
19.3 Customer Agreements – Special Circumstances	X				X		X	X		X	
20. Manufacturing and Operations Controls					X		X	X		X	
20.2 Product Identification and Traceability	X				X		X	X		X	
20.3 Handling, Storage, Packaging, Preservation and Delivery.	X				X		X	X		X	
20.4 Customer Property	X				X		X	X		X	
21. Measurement, Analysis and Improvement & Performance Evaluation	X	X	X	X	X	X	X	X	X	X	X
21.1 Customer Satisfaction	X	X*	X*	X*	X	X*	X	X	X*	X	X*
21.2. Internal Audits	X	X	X	X	X	X	X	X	X	X	X
21.5 Calibration	X	X	X	X	X	X	X	X	X	X	X

Quality Management System Element	Camarillo, CA	San Jose, CA	San Diego, CA	Morrisville, NC	Reynosa, Mexico	Southampton, UK	Neuchatel, Switzerland	Irvine, CA	Plano, TX	Burlington, Canada	Semtech Canada Corporation Design Sites
21.8 On-Going Reliability Testing	X				X		X			X	
22. Corrective Action Request System (CAR8D) & Improvement	X	X	X	X	X	X	X	X	X	X	X
23. Preventive Action & Improvement	X	X	X	X	X	X	X	X	X	X	X
Conflict Mineral Program	X										
Environmental Compliance	X							X		X	X
Occupational Health and Safety	X									X	X
Automotive Processes: APQP, PPAP	X								X		

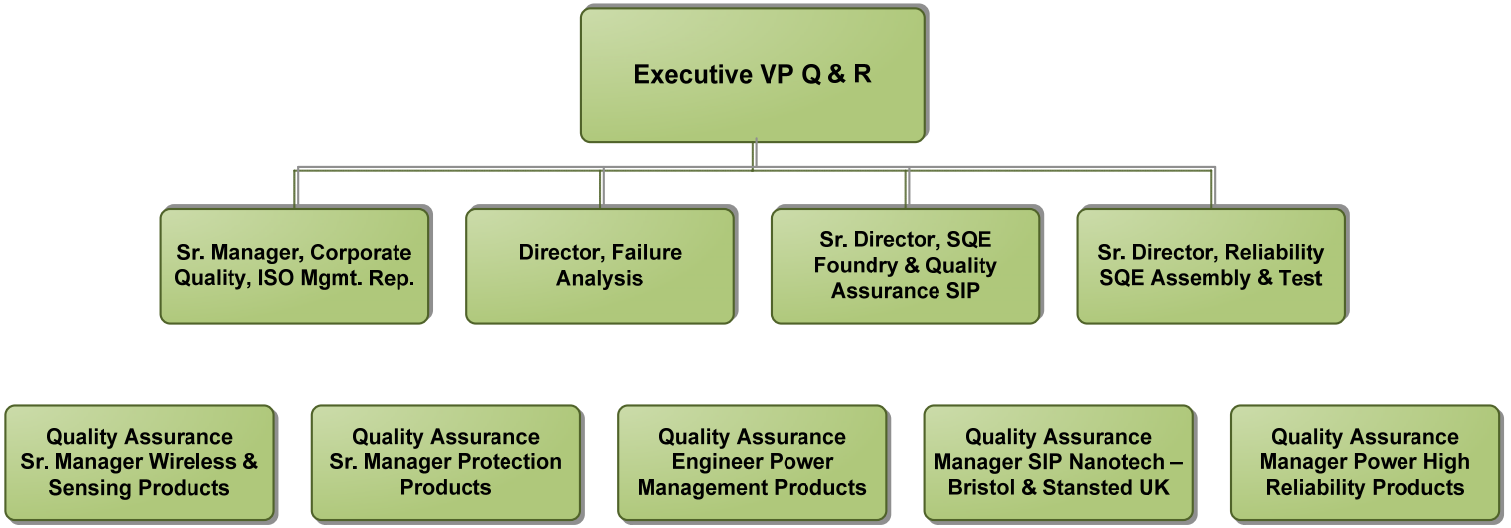
(*); Internal audit programs fall within the Corporate Audit Program and are scheduled and tracked accordingly. Furthermore, these sites maintain local site specific audit requirements.

26. Appendix C: Organization Charts

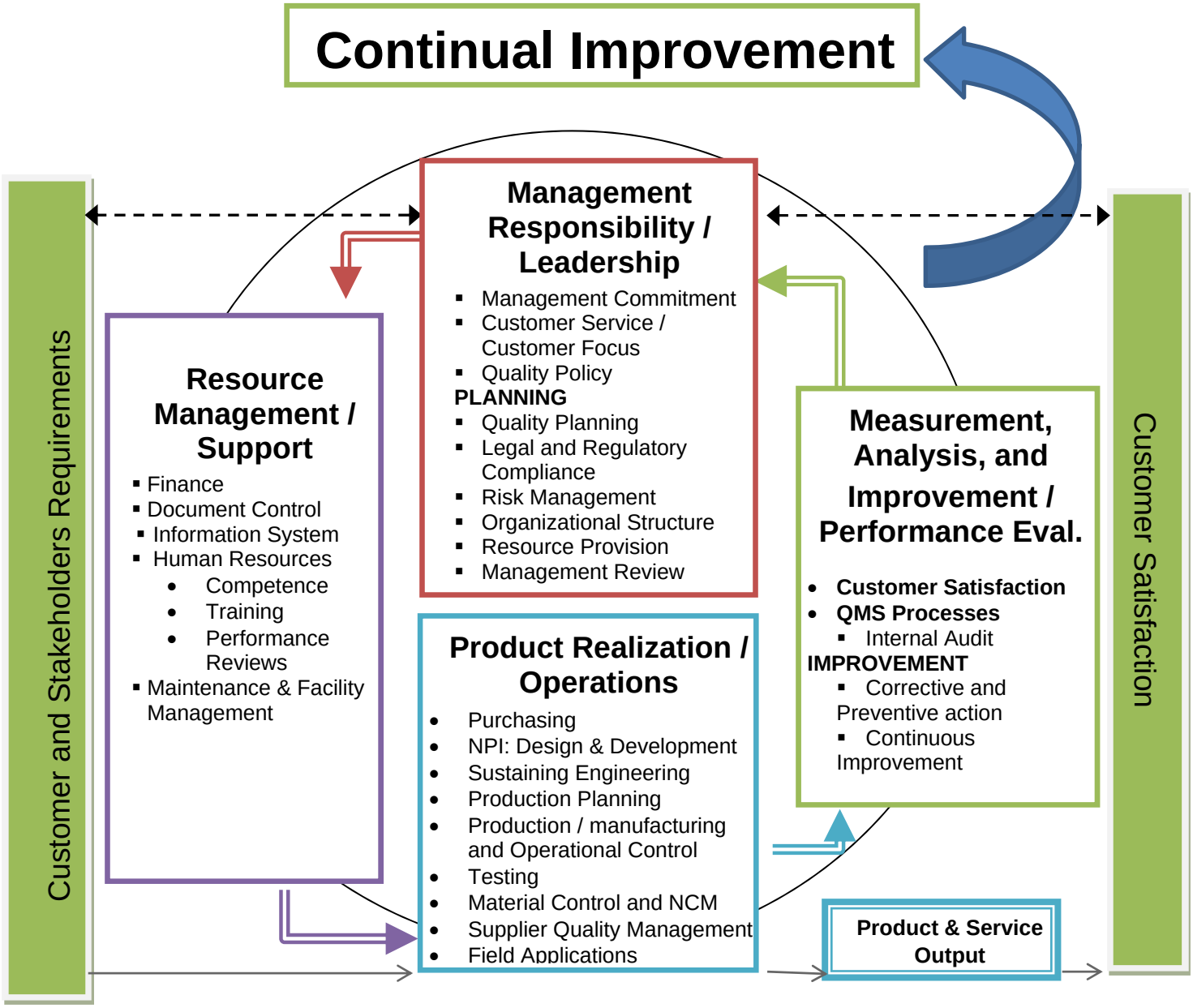
26.1 Semtech Corporation



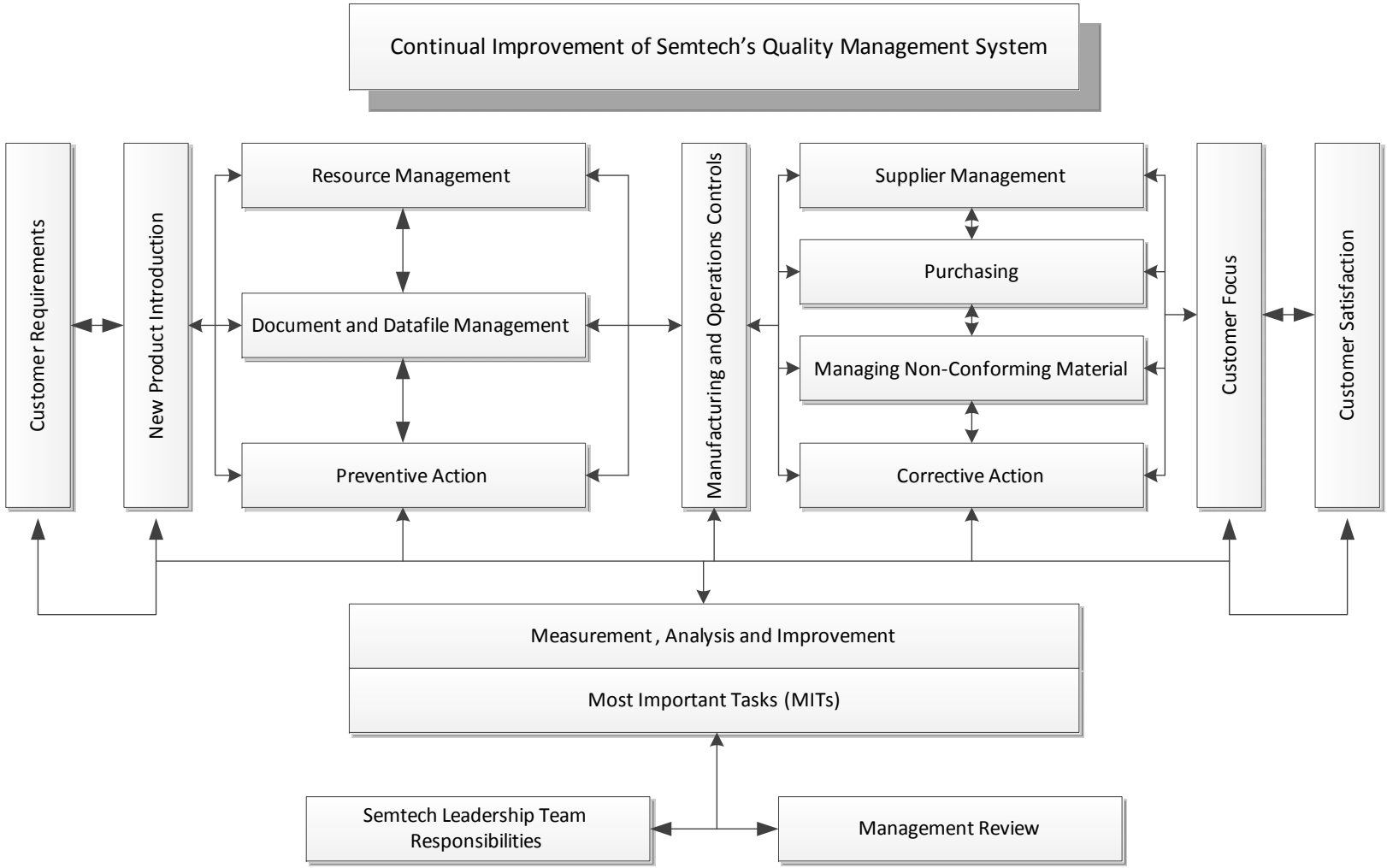
26.2. Q&R Functional Organization



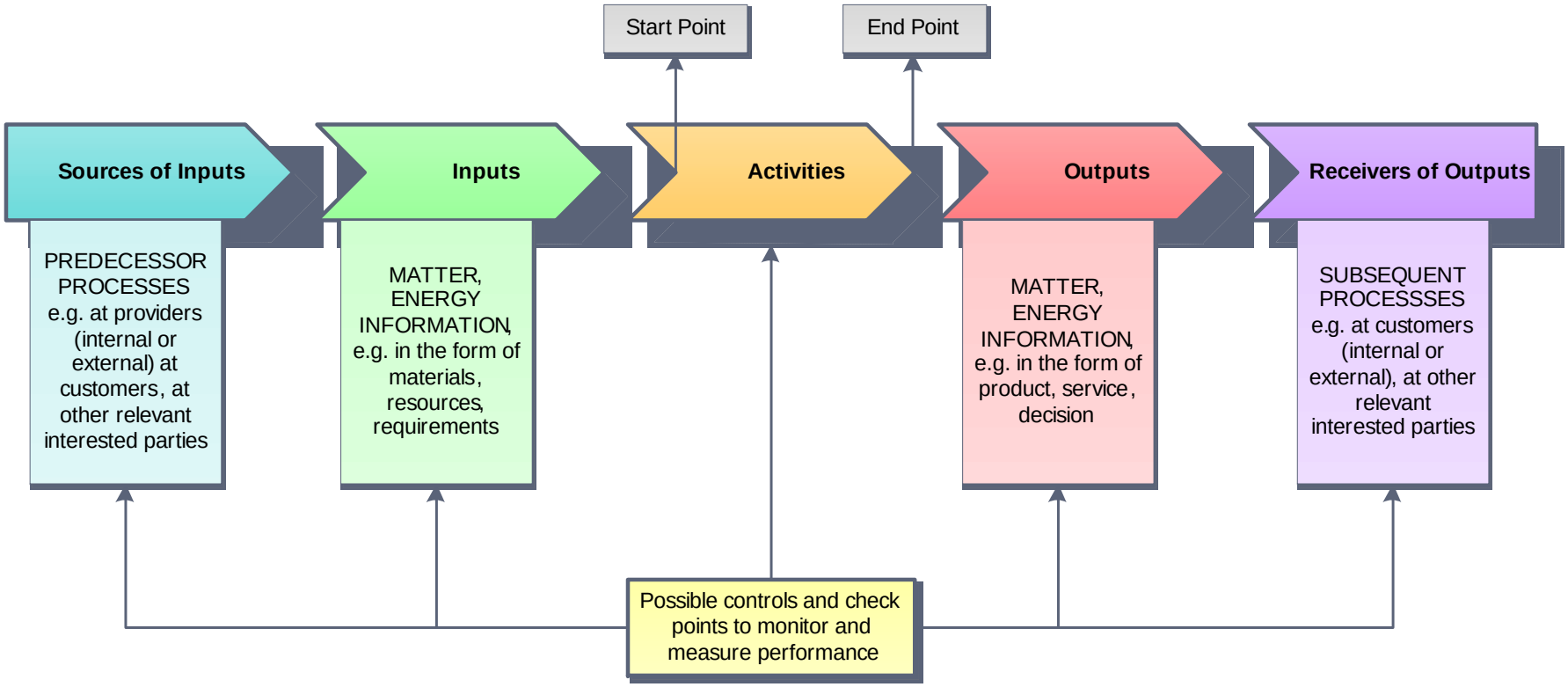
27. Appendix D: QMS Sequence & Interaction



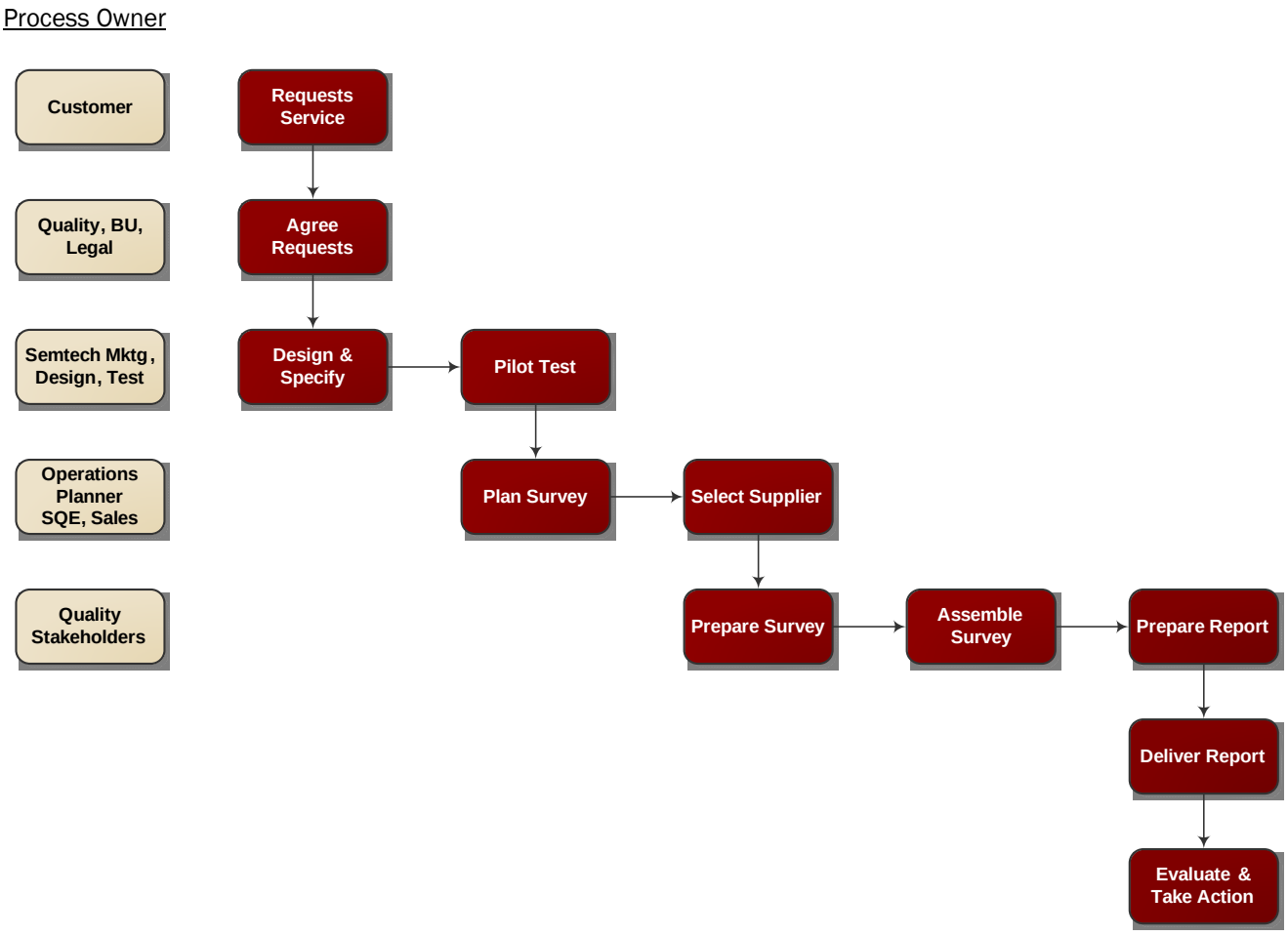
28. Appendix E: Subcategory Support Flow



29. Appendix F: Elements of a Single Process / Risk Assessment Focus



30. Appendix G: Process Map for Internal Risk / Risk Management - Opportunity



31. Appendix H: External Risk – Risk Impact / Probability Chart

Context Issues	Impact (1-5)	Probability (1-5)	Detectability (1-5)	Impact X Probability ÷ Detectability
Technology	3	4	4	3
Market	5	4	4	5
Competition	4	4	4	4
Customer	5	3	5	3
Material Sourcing; Vendor	4	3	5	2.4
Supplier Sourcing: Back-up	3	3	5	1.8
Supplier Resources	3	4	4	3
Supplier Certification	2	2	3	1.33
Semtech Certification	2	1	2	1

RATING	RISK	ACTION
1	Trivial	No action is required and no documentation records need to be kept
2	Tolerable	No additional controls are required. Monitoring is required to ensure that the controls are maintained.
3	Moderate	Efforts should be made to reduce the risk, but the costs of prevention should be carefully measured and limited. Risk reduction measures should be implemented within a defined time period.
4	Substantial	Risk mitigation efforts must be considered. Considerable resources may have to be allocated to reduce the risk. Where the risk involves work in progress, urgent action should be taken.
5	Intolerable	Risk mitigation efforts must be in place and monitored until the risk has been reduced. Action plans, goals and targets will need to be reassessed, revised or replaced to reduce the risk.

32. Appendix I: QMS Relationship with ISO 9001

This appendix provides a cross reference of Semtech's Quality Management System with ISO 9001 & IATF 16949 requirements.

Quality Management System Element	ISO 9001 – 2008 Clause	IATF 16949: 2016 Clause	ISO 9001: 2015 Clause
1. Quality Management System Overview	4.1	4	4, 4.1, 4.2,
1.1 QMS Process & Sequence	4.1	4.1	4.4
1.2 Quality Management System Policies	4.1, 4.2.1	4.1	4.4, 8.4
1.3 Scope of Management Systems	4.1.3	4.1.3	4.3
1.4 Quality Manual Policies	4.2.2	4.2.2	4.3, 7.5.1, 4.4, 6.2
1.5 Control of Documents	4.2.3	4.2.3	7.5.2, 7.5.3
1.11 Control of Quality Records	4.2.4	4.2.4	7.5.2, 7.5.3
1.13 Semtech Knowledge			7.1.6
2. Risk Management			6.1, 6.3
3. Context of the Organization			4, 4.1
3.5 Semtech's Competition			4.1
3.6 Interested Parties			4.2
4. Core Values			
5. Quality Policy / Leadership Focus	5.3	5.3	5.2, 5.2.1, 5.2.2
5.1 Achieving Semtech's Goals / Planning Focus			6.2
6. Semtech's Leadership Team Commitment and Responsibilities / Leadership	5.1, 5.2, 5.4.1	5.1	5.1, 5.1.1
6.1. Most Important Tasks (MITs)	5.4.1	5.4.1	6.2
6.2. Department Roles & Responsibilities / Leadership Focus	5.5.1	5.5.1, 5.5.1.1	5.3
6.3. Business Unit Manager's Roles & Responsibilities / Leadership Focus	6.5.1	5.5.1	5
7. Management Representative(s)	5.5.1, 5.5.2	5.5.2	5
8. QMS Continuous Improvement / Planning	5.4.2, 8.5.1	5.4.2, 8.5.1	6.1, 10.1,10.3
9. Customer Focus	5.2	5.2	5.1.2
9.1. Customer Care	7.2.3	7.2.3	5.1.2, 8.2.1
9.4. Customer Requirements Review	5.2, 7.2.1, 7.2.2,	5.2, 7.2.1, 7.2.2,	5.1.2, 8.2.1,

Quality Management System Element	ISO 9001 – 2008 Clause	IATF 16949: 2016 Clause	ISO 9001: 2015 Clause
	7.2.3	7.2.3	8.2.2, 8.2.3, 8.2.4
9.5. Customer Notifications	7.2.3	7.2.3, 7.2.3.1	8.2.1
9.5.1.1 Policy – Automotive Product			
9.6 Failure Analysis			
10. Quality Planning / Operations & Planning Focus			8, 6.2
11. Management Review / Performance Evaluation	5.6	5.6	4, 4.1, 4.2, 9.3
11.1 QMS Continuous Improvement / Improvement and Performance Focus	5.5.3, 5.6.3	5.6.1.1, 5.4.2, 5.5.3	7.4, 9.3.3
11.2 Quarterly Business Reviews	5.6.1, 5.6.2, 8.4	5.6.1.1, 5.6.2, 8.4	9.3.1, 9.3.2, 9.1.3
11.4 Site QMS Reviews	5.6.2	5.6.2	9.3.2
12. Resource Management / Support	6.1, 6.3, 6.4	6, 6.1, 6.2	7, 7.1,
12.1 Training and Development	6.2.1 , 6.2.2	6.2.2, 6.2.2.2, 6.2.2.3	7.2, 7.3
12.2 Infrastructure	6.3	6.3	7.1.3
12.3 Work Environment	6.4	6.4	7.1.4
13. New Product Introduction / Operations	7.1, 7.2, 7.3	7.1, 7.3	8.3
13.1. Phase 1: Product Definition	7.1, 7.3.1	7.1, 7.3	8.3.2
13.2. Phase 2: Product Design	7.3.1, 7.3.3, 7.3.4	7.3.2, 7.3.2.1	8.3.2, 8.3.4, 8.3.5
13.3. Phase 3: Design Validation	7.3.1, 7.3.3, 7.3.5, 7.3.6	7.3.5, 7.3.6	8.3.2, 8.3.5, 8.3.4,
13.4. Phase 4: Qualification	7.3.1, 7.3.4, 7.5.1, 7.5.2	7.5.1, 7.5.2	8.3.2, 8.3.4, 8.5.1
13.5. Design Modifications	7.3.7	7.3.7	8.3.6, 8.5.6
14. Managing Customer Contracts	5.2, 7.2.1, 7.2.2, 7.2.3	5.2, 7.2.1, 7.2.2, 7.2.3	5.1.2, 8.2.2, 8.2.3, 8.2.4
15. Documentation and Key Datafile Management	4.2.1, 4.2.3	4.2.3, 4.2.4	7.5, 7.5.2, 7.5.3
15.2. Quality Records	4.2.4	4.2.4, 4.2.4.1	7.5.2, 7.5.3
15.2.1 Policy – Automotive Records			
16. Supplier Management	7.4.1	7.4.1, 7.4.3.2	8.4, 8.4.2
16.1. Qualification of Wafer Fab Processes	7.4.1, 8.5.3	7.4.1	8.4, 8.4.2, 6.1, 10.3
16.6 Qualification of Assembly & Final Test Processes	7.4.1, 8.5.3	7.4.1	8.4, 8.4.2, 6.1, 10.3
16.7 Supplier Corrective Action (SCAR)	7.4.1	7.4.3.2, 8.5.1	8.4, 8.4.2
16.8 Supplier Audits	7.4.1	7.4.3.2, 8.5.1	8.4, 8.4.2
16.9 Supplier Report Cards	7.4.1	7.4.3.2, 8.5.1	8.4, 8.4.2
17. Anti-Counterfeit Program / Risk Assessment & Risk			6.1, 6.2

Quality Management System Element	ISO 9001 – 2008 Clause	IATF 16949: 2016 Clause	ISO 9001: 2015 Clause
Mitigation Focus			
17.1 Counterfeit Avoidance			6.1
18. Purchasing	7.4.1, 7.4.2, 7.4.3	7.4.1, 7.4.2, 7.4.3	8.4.3, 8.4.2, 8.6
18.1 Purchasing Control Information			
18.2 Purchasing Information			
18.2.2 Control of Production and Service	7.5.1	7.5.1	8.5.1, 8.5.5
18.2.3 Validation of Processes for Production and Service	7.5.2	7.5.2	8.5.1
19. Managing Non-Conforming Material	8.3	8.3, 8.3.1	8.7, 10.2
19.3 Customer Agreements – Special Circumstances			
20. Manufacturing and Operations Controls	7.5.1, 8.2.3, 8.2.4	8.2.4, 8.2.3, 7.5.1	8.5.1, 8.5.5, 8.6
20.2 Product Identification and Traceability	7.5.3	7.5.3, 7.5.3.1	8.5.2
20.3 Handling, Storage, Packaging, Preservation and Delivery.	7.5.5	7.5.5	8.5.4
20.4 Customer Property	7.5.4	7.5.4	8.5.3
21. Measurement, Analysis and Improvement & Performance Evaluation	8.1. 8.2.1	8, 8.2	9.1.2
21.1 Customer Satisfaction	5.2, 7.2.1, 8.2.1	8.2.1, 8.2.1.1	5.1.2, 8.2.2, 9.1.2
21.2. Internal Audits	8.2.2	8.2.2, 8.2.2.4, 8.2.2.5	9.2
21.5 Calibration	7.6	7.6, 7.6.2	7.1.5, 7.1.5.2
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23. Preventive Action & Improvement	8.5.3, 8.4	8.5.3	6.1, 10.3, 9.1.3
23.3 Process Control Plans			6.1
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25. Appendix B: Site Application of QMS Process			
26. Appendix C: Organization Charts			
27. Appendix D: QMS Sequence and Interaction			
28. Appendix E: Subcategory Support Flow			
29. Appendix F: Elements of a Single Process / Risk Assessment Focus			6.1
30. Appendix G: Process Map for Internal Risk / Risk Management - Opportunity			6.1, 6.3
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