



Title: Spansion Quality Manual

INTRODUCTION

Spansion is a leading provider of the Flash memory technology at the heart of the world's electronics systems. The company's products power everything from the routers that run the internet to the highly interactive and immersive consumer and automotive electronics that are enriching people's daily lives.

Spansion's broad and differentiated Flash memory product portfolio, award-winning MirrorBit® charge trapping technology, and industry leading service and support enable customers to achieve greater efficiency and success in their target markets. Leading OEMs in the automotive, consumer and gaming, communications, and industrial segments rely on Spansion's Flash memory solutions. For more information, visit <http://www.spansion.com>.

Spansion draws upon its rich history of technological innovation and market leadership that dates back to the early days of the Flash memory market. Spansion has approximately 3,000 employees around the globe and is listed on the New York Stock Exchange with the trading symbol CODE.

Spansion has sales offices worldwide with facilities in Sunnyvale, California; Austin, Texas; Munich, Germany; Bangkok, Thailand; Penang, Malaysia; and Kawasaki, Japan.

The company is headquartered in Sunnyvale, California. Management at Spansion follows the quality management principles defined in ISO 9004 as a means toward attaining improved performance throughout the organization. The aforementioned principles are:

Principle 1 Customer Focus

Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.

Principle 2 Leadership

Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

Principle 3 Involvement of People

People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.

Principle 4 Process Approach

A desired result is achieved more efficiently when activities and related resources are managed as a process.

Principle 5 System Approach to Management

Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.

Principle 6 Continual Improvement

Continual improvement of the organization's overall performance should be a permanent objective of the organization.

Principle 7 Factual Approach to Decision Making

Effective decisions are based on the analysis of data and information.

Principle 8 Mutually Beneficial Supplier Relationships

An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

These principles serve as the foundation for planning, implementing, and continually improving both product realization and support processes. Through the balanced use of metrics (e.g., management by metrics, dashboard approach), top management synthesizes and deploys its strategic plan. To facilitate fruition of these objectives, key processes for developing, manufacturing, and supplying products are monitored, measured, analyzed, and improved. Pertinent data and information is periodically reviewed by top management, thereby ensuring the effective and efficient operation of the overall system.

Spanion employees, working within this customer-centric and process-based system, further contribute their unique and inspired corporate culture to create the leading Flash brand in the world that is designed to reward the needs of its customers, suppliers, employees, and shareholders.

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1.0 PURPOSE, SCOPE, and APPLICATION

1.1 Purpose

This manual describes the core processes and responsibilities for Spansion's quality management system that are designed to exceed: customer requirements, quality goals/objectives, and industry standards such as ISO 9001 and ISO/TS 16949.

1.2 Scope

This quality manual applies to all Spansion employees worldwide.

The Spansion quality management system described within is the result of the amalgamation of the AMD and Fujitsu quality management systems. However, since the company's inception, Spansion has evolved and developed its own independent and self-sustaining quality management system reflective of its unique culture and character.

As specified in section 1.3, ISO/TS 16949:2009 is the quality management system model used to manage the processes within Spansion. The leading paragraphs for each section of this manual cover the requirements of ISO 9001:2008. The additional requirements of ISO/TS 16949, including Customer Specific Requirements (ISO/TS-16949) Semiconductor Commodity, apply to all sites and organizations specified in section 1.3 and are parenthetically denoted throughout this document. Customer Specific Requirements (ISO/TS-16949) Semiconductor Commodity is identified with the addition of an "S" to the paragraph number.

The scope of registration is documented on the corporate certificate that is available via <http://www.spansion.com/Support/quality/Pages/QSECertificates.aspx>

Each location is responsible for executing its delegated business functions. Compliance with the requirements herein is commensurate with each site's business functions and responsibilities.

1.3 Application

ISO/TS 16949:2009

Spansion Inc. (non-manufacturing), located in California and Texas, complies with ISO/TS 16949.

Nihon Spansion Limited (non-manufacturing) and Nihon Spansion Trading Limited (non-manufacturing), located in Kawasaki, Japan, comply with ISO/TS 16949.

Spansion Israel Ltd. (non-manufacturing), located in Netanya, Israel, complies with ISO/TS 16949.

The ESC (European Service Centre) located in Munich, Germany, supports the sites by performing device analysis. The ESC complies with ISO/TS 16949 in support of Spansion for device analysis.

Spansion Fab 25, located in Austin, Texas, complies with ISO/TS 16949. This facility supports 7.3 (Design and Development) by providing data and information, but is not responsible for managing the processes or retaining the data.

Spansion (Thailand) Limited, located in Thailand, complies with ISO/TS 16949. This facility supports 7.3 (Design and Development) by providing data and information, but is not responsible for managing the processes or retaining the data.

Spansion (Penang) Sdn. Bhd., located in Penang, Malaysia, complies with ISO/TS 16949 for both non-manufacturing and manufacturing processes. This facility supports 7.3 (Design and Development) by providing data and information, but is not responsible for managing the processes or retaining the data.

2.0 REFERENCES

2.1 Appendices

Appendix A – Referenced Specifications/Documents by Quality Manual Sections

Appendix B – Quality Management System Definitions

Appendix C – Spansion’s Quality Management System Core Process Map

2.2 Other References

AEC – Q100	Stress Test Qualification for Integrated Circuits
ISO 9000	Quality Management Systems – Fundamentals and Vocabulary
ISO 9001	Quality Management Systems – Requirements
ISO 9004	Managing for the Sustained Success of an Organization – A Quality Management Approach
ISO/TS 16949	Quality Management Systems – Particular Requirements for the Application of ISO 9001:2008 for Automotive Production and Relevant Service Part Organizations
ISO/TS 16949	Customer Specific Requirements (ISO/TS-16949) Semiconductor Commodity
ISO 14001	Environmental Management System
OHSAS 18001	Occupational Health and Safety Management System

3.0 DEFINITIONS

Appendix B contains the definitions for words, acronyms, and phrases that may be used to describe the quality management system in this manual.

4.0 QUALITY MANAGEMENT SYSTEM

4.1 General Requirements

- a) This manual identifies the processes needed for the quality management system.
- b) The sequence and interaction of these processes is demonstrated by Spansion's Quality Management System Core Process Map (Appendix C).
- c) The supporting documents that are listed in the individual sections define the criteria and methods needed to control and measure the effectiveness of the various processes.
- d) Resource availability is determined and provided by the annual and rolling six quarter planning process where project and functional needs are addressed to ensure customer requirements are met.
- e) The data collected from the various processes that measure customer satisfaction, product performance, and quality management system capability are monitored, measured, and analyzed by the responsible organizations.
- f) Information is presented to management for action for continual improvement and where necessary, corrective action.

Where Spansion chooses outsourcing as an alternative to internal operations, the controls established by GSM and/or local procurement procedures govern this process. The controlling organization is responsible for ensuring control over such processes and for identifying the controls within the quality management system. This is implemented at the supplier by either contract or purchase order, e.g., Foundry and Joint Venture Quality Policy <F00-046>.

4.1.1 General Requirements – Supplemental (ISO/TS 16949)

Where Spansion elects to outsource processes related to a product or service, the controlling organization is responsible for ensuring conformity to all customer requirements, e.g., Design Development and Qualification Procedure <F01-002.1> and Quality Requirements for Spansion Final Manufacturing Subcontractors <F03-070>.

4.2 Documentation Requirements

4.2.1 General

The quality management system documentation includes the following

- a) Spansion's quality policy as stated in section 5.3 and quality objectives as documented in annual business plans and located either on a Web site or in hard copy signed and dated by the top manager for the responsible function
- b) Spansion Quality Manual <F00-001>
- c) Documented procedures and records required by ISO 9001
 - Document Management Policy <F00-098>
 - Records Management Policy <F00-014>
 - Corporate Audit and Assessment Policy <F00-007>, Internal Audits <608-QR018>
 - Decision Record System <F01-018>
 - Corrective Action System <F01-020>
 - Preventive Action System <F01-028>
 - Corrective and Preventive Action <608-QR007>
- d) Documents, including records, needed by Spansion for effective planning, operations and control (addressed in each section and sub-section of this manual). Where a procedure is not required, but information and controls are needed, this manual defines the requirements for specific sections.

4.2.2 Quality Manual

Spansion maintains a quality manual that includes

- a) the scope of the quality management system, including details of and justifications for any exclusions (reference sections 1.2 and 1.3)
- b) documented procedures which are referenced within each section, as applicable
- c) a description of the interaction between the processes of the quality management system. Reference Spansion's Quality Management System Core Process Map (Appendix C) and applicable audit planning matrices.

4.2.3 Control of Documents

Document Management Policy <F00-098> defines a minimum set of business processes required to ensure the appropriate management of Spansion generated documents.

- a) Documents are approved for adequacy prior to use in accordance with Specification System <F01-008>. Changes to specifications are consistently reviewed and approved by the organizations affected by the change.
- b) Documents are reviewed and updated and re-approved in accordance with Specification System <F01-008>.
- c) Changes are identified in accordance with Controlled Specification and Distribution Process <F08-2001>.

- d) Current versions of applicable documents are available at points of use as required by Specification System <F01-008>.
- e) Specification System <F01-008> ensures that documents remain legible and readily identifiable.
- f) Documents of external origin, such as standards and customer drawings, are controlled in accordance with External Spec/Standard Control <F01-401>, and Process Flow System <F01-006>.
- g) Obsolete specifications are promptly removed from all distribution points in accordance with Specification System <F01-008>.

4.2.3.1 Engineering Specifications (ISO/TS 16949)

Customer engineering standards/specifications are reviewed in a timely manner in accordance with Process Flow System <F01-006>, General Customer Specification Review Standard Operating Procedure <F08-072>, and Customer Drawing Review Standard Operating Procedure <F08-074>. Changes to specifications released to manufacturing are addressed in Controlled Specification and Distribution Process <F08-2001>.

4.2.4 Control of Records

Each department manager is responsible for ensuring that records are maintained to provide evidence of conformity to requirements and of the effective operation of the quality management system. Records are controlled in accordance with Records Management Policy <F00-014>.

4.2.4.1 Records Retention (ISO/TS 16949)

Record retention requirements, which satisfy statutory, regulatory and customer requirements, are identified in Records Management System <F01-036>.

4.2.4.1S Control of Records (ISO/TS 16949)

Records pertaining to characterization of products and design of experiments used to demonstrate conformance for automotive products are maintained in accordance with Records Management System <F01-036> for the production and service life.

5.0 MANAGEMENT RESPONSIBILITY

5.1. Management Commitment

Top management provides evidence of its commitment to the development and implementation of the quality management system and the continual improvement of its effectiveness by

- a) communicating the importance of meeting customer, statutory and regulatory requirements by means of Web site presentations, email and communication meetings
- b) establishing the quality policy referenced in section 5.3
- c) ensuring that annual quality objectives are established to meet the business needs for the corporation and that each business group's objectives are established to support corporate objectives
- d) conducting management reviews on a scheduled basis at various operational levels with required input data addressed and rolled up to top management
- e) ensuring the availability of resources via annual forecasts, business plans and specific project requirements

5.1.1 Process Efficiency (ISO/TS 16949)

Top management for Spansion reviews the product realization processes and the supporting processes to assure their effectiveness and efficiency at planned intervals as specified in Spansion Operations Functions and Key Processes <F01-001.1>, Management Responsibility <608-QR006>, FMO Management Review Procedure <F08-023>, and Fab 25 Management Review <307-0002>.

5.2 Customer Focus

Top management ensures customer requirements are ascertained and fulfilled with the aim of enhancing customer satisfaction.

Spansion's program for measuring customer satisfaction is comprised of three components – internal performance indicators, customer surveys, and perception reports as described in Customer Satisfaction Measurement <F01-224>. Internal performance indicators address product quality measurements, delivery measurements and field failures; customer satisfaction surveys are conducted at scheduled intervals; and customer perception reports (CPR) are published on a regular basis to communicate the customer's perception of Spansion's quality, reliability, and service, CCAR information, and quarterly highlights.

5.3 Quality Policy

Spansion's quality policy is

“Spansion has zero tolerance for customer – perceived problems in our drive toward total customer satisfaction.”

The company believes that customers should not experience any problems when designing in, manufacturing with, and supporting systems that include Spansion product. While organizations may set quantitative, non-zero goals for quality and reliability in any given annual plan, the

company strives ultimately to achieve zero defects. Furthermore, if a customer believes there is a quality or reliability issue with Spansion product, then the Spansion memory team works with the customer to resolve the issue regardless of origin or nature.

To support the quality policy Spansion

- a) proactively identifies, understands, and rapidly resolves quality and reliability issues reported by customers or determined from internal sources of data, and
- b) develops and implements a systematic approach to building in quality and reliability by driving continual improvement in all processes related to development, manufacturing, and support of products.

The quality policy is communicated and understood within the organization and reviewed periodically for continuing suitability.

5.4 Planning

5.4.1 Quality Objectives

The requirement for establishing quality objectives at relevant functions and levels within Spansion is defined in Business Planning Overview <Overview 2A>.

5.4.1.1 Quality Objectives – Supplemental (ISO/TS 16949)

Quality objectives and measurements are part of the business plan as defined in Business Planning Overview <Overview 2A>.

5.4.1.1S Quality Objectives – Supplemental (ISO/TS 16949)

The technology portion of the business plan includes:

- technology roadmaps
- wafer fabrication processes
- assembly/packaging
- obsolescence
- quality roadmaps
- product development roadmaps

These requirements are detailed in Business Planning Overview <Overview 2A>.

5.4.2 Quality Management System Planning

Top management ensures that

- a) the planning of the quality management system to meet quality objectives is carried out via planning meetings and documented in organizational and site business plans. All aspects of the quality management system are considered such as human resources, training, equipment/tooling, and facilities.
- b) as new systems and changes are implemented, the integrity of the quality management system is maintained.

5.5 Responsibilities, Authority and Communication

5.5.1 Responsibility and Authority

Specific responsibilities and authorities for Spansion's core and support processes are defined in organization charts, documented procedures, and the performance management process.

Divisional management is responsible for defining and documenting the organizational structure of personnel required to meet customer and quality management system requirements. Employees, with the exception of Directors and above, are required to have Job Descriptions, which identify and describe positions within the organization. All departments and personnel have clear responsibilities for continual improvement, emphasizing defect prevention and reduction of variation and waste in the supply chain.

5.5.1.1 Responsibility for Quality (ISO/TS 16949)

Management with responsibility and authority for corrective action is promptly informed of products or processes which become noncompliant with specified requirements via escalation procedures associated with processes such as Decision Record System <F01-018>, Customer Corrective Action Request (CCAR) System <F01-022>, Customer Corrective Action Request (CCAR) and FA Support Procedure <608-QR023>, and Electrical Reject Notice <F07-038>.

Control plans have established reaction requirements to define the responsibility and authority for personnel who control conformity to product requirements. The reaction plan requires that production be stopped, if necessary. Each manufacturing location allocates personnel for all shifts that have been delegated responsibility for ensuring conformity to product requirements.

5.5.2 Management Representative

Spancion top management appoints a management representative. Where required in other organizations and sites, the responsible vice president or plant manager appoints a management representative. Management representatives, irrespective of other duties, are responsible for

- a) ensuring that the quality management system is implemented and maintained in compliance with referenced standards and contractual requirements, as applicable,
- b) reporting on the performance of the quality management system to top management for review and as a basis for continual improvement and,
- c) ensuring the promotion of awareness of customer requirements throughout the organization.

5.5.2.1 Customer Representative (ISO/TS 16949)

Spancion top management appoints a customer representative. The customer representative is responsible for ensuring customer requirements are met. This includes selection of special characteristics, setting quality objectives and related training, corrective and preventive actions, and product design and development.

5.5.3 Internal Communication

Spancion management has established several lines of communication to inform employees regarding the effectiveness of the business and quality management system. The primary method is personal computers where employees receive email messages from top management. There are Web pages that have departmental and company information.

Each organization has communication meetings to keep employees informed. Training classes are also used to communicate information and knowledge. Management Review meetings are used to retrieve information about the organization and to provide a forum for communicating to members of the staff.

5.6 Management Review

5.6.1 General

The responsible vice president and/or plant managers, assisted by area management, perform, as a minimum, a yearly review of the quality management system for their respective sites. The purpose of the review is to ensure the continuing suitability and effectiveness of the quality management system in meeting the organization's goals and quality objectives, satisfying the requirements of ISO 9001, and assessing opportunities for improvement.

Spancion locations follow management review procedures such as Spancion Operations Functions and Key Processes <F01-001.1>, Management Responsibility <608-QR006>, FMO Management Review Procedure <F08-023>, and Fab 25 Management Review <307-0002>.

Changes resulting from the management review process and any other necessary changes affecting the content of this manual are communicated to Quality. A review of this quality manual is performed by Quality on a yearly basis using a cross-functional approach.

Records of management reviews and quality manual updates are maintained in accordance with Records Management Policy <F00-014>.

5.6.1.1 Quality Management System Performance (ISO/TS 16949)

All clauses and subclauses of the entire quality management system are reviewed at management review sessions or other such forums using a cross-functional approach. During these reviews, the cost of poor quality is addressed through various metrics such as scrap, rework, returns, and yield. Spancion locations follow management review procedures such as Spancion Operations Functions and Key Processes <F01-001.1>, Management Responsibility <608-QR006>, FMO Management Review Procedure <F08-023>, and Fab 25 Management Review <307-0002>.

Records of management reviews are maintained in accordance with Records Management Policy <F00-014>.

5.6.2 Review Input

The input to management review includes information on

- a) results of internal, customer and registration audits,
- b) customer feedback data from surveys, field quality issues, and where available, marketing's customer communications pertaining to continual improvements,
- c) data pertaining to process capability and product conformity,
- d) status of projects related to preventive action and the status of corrective actions pertaining to customers, internal audits, and processes/products,
- e) actions from previous meetings,
- f) review of changes to the quality management system, and
- g) recommendations for improvement.

5.6.2.1 Review Input – Supplemental (ISO/TS 16949)

Inputs to management review include data pertaining to actual and potential field failures. The information presented addresses the impact on quality, safety or environmental issues.

5.6.3 Review Output

The output from management review includes decisions and actions related to

- a) improvement of the effectiveness of the quality management system and its processes,
- b) improvement of product or processes related to customer requirements, and
- c) the appropriation of resources needed for achieving the necessary improvements.

6.0 RESOURCE MANAGEMENT

6.1 Provision of Resources

The business planning process described in sections 5.4.1 and 5.4.2 and project management methods used at Spansion provide the basis to appropriate the funding needed to provide resources to

- a) implement and maintain the quality management system and to continually improve its effectiveness, and
- b) enhance customer satisfaction by exceeding customer requirements.

6.2 Human Resources

6.2.1 General

Spansion's HR organization has established processes that provide the support to operations and administrative organizations to ensure personnel performing work affecting conformity to product requirements are competent based on the appropriate education, training, skills and experience. These procedures are maintained at the HR Web site.

The Global Performance Management System (GPMS) is a goal planning and feedback process that provides employees and management with a flexible means for establishing goals and providing specific feedback about performance on a periodic basis throughout each year.

6.2.2 Competence, Training and Awareness

Competence, Training, and Awareness Policy <F00-011> establishes the worldwide requirements to

- a) determine the necessary competence for personnel performing work affecting conformity to product requirements,
- b) provide training or other methods to satisfy these needs,
- c) evaluate the effectiveness of the actions taken,

- d) ensure that Spansion personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives, and
- e) maintain appropriate records of education, training, skills and experience as defined in Records Management Policy <F00-014>.

6.2.2.1 Product Design Skills (ISO/TS 16949)

Design Development and Qualification Procedure <F01-002.1> and FMO/APT provide for and utilize, where appropriate, the necessary hardware, software, and human resources to accomplish DFM, DFA, Simulation, CAD/CAE, and any other skill sets or tools needed to assure successful circuit design. Skill Maps are utilized at specified locations to determine and track design skills. Product development and FMO/APT perform design FMEAs and reliability planning for all new Spansion memory products.

6.2.2.2 Training (ISO/TS 16949)

Competence, Training, and Awareness Policy <F00-011> establishes the processes for identifying training needs and achieving competence of all personnel performing activities affecting conformity to product requirements. Those employees performing specific assigned tasks are qualified with specific attention to the satisfaction of customer requirements.

6.2.2.2S Training (ISO/TS 16949)

Training and certification requirements for production personnel are specified in Corp. Manufacturing Training System <F01-210>.

6.2.2.3 Training on the Job (ISO/TS 16949)

On-the-job training (OJT) is a major method for training Spansion employees and contract or agency personnel as specified in Competence, Training, and Awareness Policy <F00-011>. Records for OJT may be in formal training records for production personnel and technicians or for administrative and technical staff, the information may reside in the human resource performance record.

6.2.2.4 Employee Motivation and Empowerment (ISO/TS 16949)

Competence, Training, and Awareness Policy <F00-011> specifies the methods used to motivate and empower employees as well as measure the extent to which personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives.

Employees are encouraged to collaborate across business and manufacturing operations via their involvement within continuous improvement projects. The Kaizen+ Program provides employees with the knowledge, skills, and tools necessary to effectively conduct the aforementioned activities.

6.3 Infrastructure

The business planning process outlined in Business Planning Overview <Overview 2A> provides the basis for

- a) buildings, workspace and associated utilities,
- b) process equipment (both hardware and software) and,
- c) supporting services (such as transport, communication, or information systems).

6.3.1 Plant, Facility and Equipment Planning (ISO/TS 16949)

Project management methodology is used to establish the necessary infrastructure for new products, new production and design needs. Plant layouts are determined by industrial engineering for optimization and cost to ensure value-added use of floor space. Methods are developed and implemented to evaluate and monitor the effectiveness of existing operations, e.g., competitive data from subcontractors, simulation models. Reference Spansion Penang Relayout <808-012> and Layout Planning and Execution <708-106>.

6.3.2 Contingency Plans (ISO/TS 16949)

A team approach is utilized as specified in FMO – Contingency Planning for Business Recovery <F08-121>, Spansion Sunnyvale – Facilities Contingency Plan <F01-525>, and Fab 25 Contingency Plan for Business Recovery <307-8466> to provide continual service to the customer during events of emergency such as utility interruptions, labor shortages, key equipment failure and field returns.

6.4 Work Environment

The facilities department for each factory and support area controls the work environment. The defined requirements are documented in minimum area requirements specifications such as Sort/Wet Area Requirements <F01-123>, Wafer Fabrication Area Requirements <F01-124>, Test Area Requirements <F01-125>, Burn-In Area Requirements <F01-126>, Assembly Area Requirements <F01-127>, and Mark and Pack Requirements <F01-128>.

The Environmental, Health and Safety (EHS) program is committed to protecting the environment and the health and safety of employees and the surrounding communities. This commitment has led to the certification of all manufacturing sites to ISO 14001, which requires systems to be

established to identify, communicate, and manage the environmental impact of the company's operations. Reference <http://www.spansion.com/Products/Quality/Pages/QSECertificates.aspx>

6.4.1 Personnel Safety to Achieve Conformity to Product Requirements (ISO/TS 16949)

Spansion has also established Occupational Health and Safety (OHS) management systems as integral parts of EHS management systems at all manufacturing facilities to minimize potential risks to employees especially in the design and development process and in manufacturing process activities. Several manufacturing facilities are certified to OHSAS 18001. Reference <http://www.spansion.com/Products/Quality/Pages/QSECertificates.aspx>

Product safety is considered in design control and process control practices. Employees are apprised of safety considerations relative to the product.

6.4.2 Cleanliness of Premises (ISO/TS 16949)

Facilities are maintained in an appropriate level of cleanliness, order and repair consistent with the product and manufacturing process requirements. Lean manufacturing principles are applied such as those of 5S. The 5S methodologies and practices are implemented to simplify the work environment, reduce waste, and improve quality and safety. Greater efficiency through work place design, improved maintenance of machinery, and a reduction of non-value added activities are but some of the benefits derived from the 5S philosophy and culture.

6.4.2S Cleanliness of Premises (ISO/TS 16949)

The following environmental and housekeeping items are controlled, as appropriate:

- a) Handling Procedure for Prevention of ESD Damages <F00-016>
- b) Airborne particle requirements as defined in Atmosphere Quality Levels <F16-022>
- c) Chemical particles as specified by material specifications <04-XXXXXXX> and Gas Line Filtration <16-019> for particles for gas supply
- d) Machine particle count as specified in Atmosphere Quality Levels <F16-022>
- e) Humidity and temperature as specified in Atmosphere Quality Levels <F16-022>
- f) Water resistivity as specified in DI Water/UPW Limits <F16-023>
- g) Robing requirements, discipline and general workstation cleanliness as specified in work instructions <07-XXX> and process specifications <05-XXX>

7.0 PRODUCT REALIZATION

7.1 Planning of Product Realization

Spansion has a comprehensive product realization process for developing new products, technologies, and businesses. It is based upon the product life cycle and includes a tracking system and a dedicated set of specifications and procedures. The PLC (Product Life Cycle) is the methodology or framework for all business processes impacting Spansion products from product conception to obsolescence. UMS (Unified Milestone System) is the tracking system for all the major milestones and review points within each PLC stage. Spansion's 002 system of specifications and procedures is used to fully document the PLC/UMS process.

Product realization planning is a three-part process.

- The first part pertains to product design and process development for future products (typically greater than two years).
- The second is the planning for new product design and development (typically less than or equal to two years).
- The third pertains to existing products with various customer requirements.

This section covers the first two planning methods since there is some similarity. The third planning methodology is covered in section 7.2.

During the business planning process described in section 5.4, future development for fabrication processes and assembly processes are considered. This becomes the basis for establishing future semiconductor integrated circuits. The appropriation of funds to support future product design and development starts with customer needs that are established by market analysis and close customer relationships. These inputs drive the long-term roadmaps for technology, packaging and products. This planning is performed during the annual budgeting process. Reference Business Planning Overview <Overview 2A>.

New product planning for a specific product may start with a proposal from a member of the staff where a marketing survey would be performed or it may be a special design for a specific customer. This process is defined in Product Planning Policy <F00-003>, Product Planning System <F01-003>, and Product Planning Procedure <F01-002.6>.

Once management approves the project for development of a new product, the following requirements are determined in accordance with Product Management Policy <F00-002> and the associated family of specifications.

- a) quality objectives and requirements for the product,
- b) establishment of the processes, documents, and resources specific to the product,
- c) the required verification, validation, monitoring, measurement, inspection and test activities specific to the product and the criteria for product acceptance, and

- d) records needed to provide evidence that the realization processes and the resulting product meet requirements.

Note: Product Management Policy <F00-002> conforms to Advanced Product Quality Planning (APQP) methodology.

7.1S Planning of Product Realization – Supplemental (ISO/TS 16949)

The product realization planning for Spansion memory products is defined by Technology Development, Qualification, and Change Management Process <F01-002.2>, Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>, Design Development and Qualification Procedure <F01-002.1>, Product Engineering Development, Qualification and Change Management Process <F01-002.4>, and Spansion TMP Process Flow and Control Plan <F02-028>. FMO Manufacturing Planning Process and System <F01-040> addresses the movement of material between locations within the product realization process. When required, FMEA methodology (DFMEA, PFMEA) is used to ensure preventive planning measures.

7.1.1 Planning of Product Realization – Supplemental (ISO/TS 16949)

Customer requirements and references to its technical specifications are included in the project plan for that product as specified in Product Planning Procedure <F01-002.6> and Design Development and Qualification Procedure <F01-002.1>.

7.1.2 Acceptance Criteria (ISO/TS 16949)

Design Development and Qualification Procedure <F01-002.1> and Spansion Qualification Guidelines <F01-002.15> address the requirements for planning the product acceptance criteria and, where required, obtaining customer approval. Acceptance data sampling plans, as specified in Product Quality Levels <F00-005>, require an acceptance number of zero.

7.1.3 Confidentiality (ISO/TS 16949)

The confidentiality of customer–contracted products and projects under development, and related product information is ensured via Design Development and Qualification Procedure <F01-002.1>.

7.1.4 Change Control (ISO/TS 16949)

Changes to materials, processes and /or product that occur during the realization process are controlled and reaction plans established prior to implementation as specified in Supplier Quality Policy <F00-037>, Spansion Operations Functions and Key Processes <F01-001.1>.

and Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>.

Unexpected changes occurring during product processing are addressed by the Decision Record System <F01-018>. Any product realization changes affecting customer requirements require notification to and agreement from the customer in accordance with Spansion Operations Functions and Key Processes <F01-001.1>.

7.1.4S Change Control (ISO/TS 16949)

Effects of process changes are verified by before and after characterization of the appropriate device parameters for both proprietary and nonproprietary designs in accordance with Product Management Policy <F00-002>.

7.2 Customer-Related Processes

7.2.1 Determination of Requirements Related to the Product

Spansion determines

- a) requirements specified by the customer for delivery and post delivery via field sales and product line marketing groups in accordance with Process Flow System <F01-006>, Contract Review Process & Support Responsibility for Field Sales and Global Customer Service <F01-045>, Change Notification Policy <F00-023>, Fab Planning/Scheduling System <F01-179>, and FMO Manufacturing Planning Process and System <F01-040>.
- b) requirements not stated by the customer but necessary for specified or intended use, where known, to ensure form, fit, function, and reliability via the design and development teams.
- c) statutory and regulatory requirements applicable to the product via Legal, Environmental Health and Safety, Human Resources, and the customer. Reference Materials Restricted from Product Design-Internal <F16-203>. It is the responsibility of the design, engineering, and management teams to implement these requirements in accordance with Product Management Policy <F00-002>.
- d) any additional requirements pertaining to the product during the design and development realization processes for inclusion in the data sheet and processing specification.

7.2.1.1 Customer – Designated Special Characteristics (ISO/TS 16949)

Customer requirements, including special characteristics, are reviewed and incorporated into Spansion's internal requirements in accordance with Process Flow System <F01-006>.

7.2.1.1S Customer – Designated Special Characteristics (ISO/TS 16949)

Where the customer has not identified special characteristics, but the need exists to control the product for proper operation, process parameters or product characteristics are identified on the control plan. Reference Assembly Process Flow Charts and Control Plan <02-001>, Spansion TMP Process Flow and Control Plan <F02-028>, and Spansion Operations Functions and Key Processes <F01-001.1>.

7.2.2 Review of Requirements Related to the Product

Spansion and distributor representatives conduct initial customer contact and negotiations. Prior to submission or acceptance of the customer's written or verbal contractual requirements, a review is conducted by either Sales Operations and/or Legal or appropriate product line personnel to ensure that

- a) the customer's requirements are adequately defined, documented and agreed to before acceptance,
- b) the process considers the resolution of any issues differing from those tendered,
- c) Spansion has the capability to meet the customer's requirements, and
- d) all customer requirements are met in accordance with Contract Review Process & Support Responsibility for Field Sales and Global Customer Service <F01-045> and TS 16949 Contract and Drawing Review Process for Field Sales <F01-045.1>.

Spansion establishes and maintains documented procedures for contract review and for the coordination of these activities. To ensure that written or verbal customer requirements are adequately documented, the requirements are entered into corporate business systems in accordance with Standard Processing Specification <F00-004> and Process Flow System <F01-006>. Customers are notified of product and product related changes that are to be implemented by Spansion in accordance with Change Notification Policy <F00-023>.

Spansion maintains procedures for internal contract review involving product groups, wafer fabs, and manufacturing services as defined in Fab Planning/Scheduling System <F01-179> and FMO Manufacturing Planning Process and System <F01-040>.

Records for these reviews are maintained in accordance with Records Management Policy <F00-014>.

7.2.2.1 Review of Requirements Related to the Product – Supplemental (ISO/TS 16949)

Waiving the requirements specified in section 7.2.2 requires written authorization from the customer.

7.2.2.2 Organization Manufacturing Feasibility (ISO/TS 16949)

Product Management Policy <F00-002>, and its associated supporting documents, provide for feasibility reviews in the form of development stage signoff / approvals for each new product as it proceeds through the 002 process. Spansion assures that it has adequately investigated and confirmed the manufacturing feasibility of proposed products prior to contracting with customers to produce those products.

7.2.2.2S Organization Manufacturing Feasibility (ISO/TS 16949)

The feasibility study, when deemed necessary by engineering management, includes a compatibility review of the current design rules, critical process capability and design / process FMEA with manufacturing personnel. Conformance to engineering requirements is demonstrated with characterization data as determined by engineering based on individual conditions. Statistical data is available to demonstrate process and product special characteristics.

7.2.3 Customer Communication

Sales, marketing, engineering, and logistics establish effective arrangements for communicating with customers. The following methods are used

- a) product information pertaining to specification requirements or logistics is communicated by telephone, mail, email or other computer methods depending on the need,
- b) where the customer has established electronic data interface requirements with Spansion, inquiries, contracts or order handling (including amendments), are handled via the computerized system. For those customers who have not, manual methods are utilized.
- c) customer feedback, including complaints, are handled in accordance with Customer Corrective Action Request (CCAR) System <F01-022>, Customer Corrective Action Request (CCAR) and FA Support Procedure <608-QR023>, or other communication methods as appropriate.

7.2.3.1 Customer Communications – Supplemental (ISO/TS 16949)

Spansion has established communication methods as defined in Spansion Operations Functions and Key Processes <F01-001.1>.

7.3 Design and Development

The requirements of this section include product and manufacturing process design and development, and focus on error prevention methodologies.

7.3.1 Design and Development Planning

The design and development for products and processes looks at three key building blocks for semiconductor integrated circuits. These building blocks are the development of the fabrication processes, the development of the package that houses the chip, and the design and development of the product. Each of these blocks may be planned and developed separately or concurrently. Product Management Policy <F00-002> addresses

- a) all phases of design from product planning to obsolescence,
- b) requirements that are appropriate for the review, verification and validation as appropriate for each design and development stage, and
- c) the responsibilities and authorities for design and development.

The project leader and the team manage interfaces between functional departments involved in the design and development. The team methodology ensures effective communications and the project management methodology ensures clear assignable tasks. Output planning is updated as appropriate using the project management processes.

7.3.1S Design and Development Planning (ISO/TS 16949)

Custom or application specific product designs obtain customer concurrence at appropriate stages of design and development as defined in Design Development and Qualification Procedure <F01-002.1>.

7.3.1.1 Multidisciplinary Approach (ISO/TS 16949)

A multidisciplinary approach is used for

- a) development/finalization and monitoring of special characteristics,
- b) development and review of FMEAs, including action to reduce potential risks, and
- c) development and review of control plans.

7.3.2 Design and Development Inputs

Design and development inputs include

- a) functional performance requirements,
- b) applicable statutory and regulatory requirements,
- c) applicable information derived from previous designs, and
- d) other requirements essential for design and development.

The project team leader and the appropriate members of the team review these inputs for adequacy and completeness prior to the start of the design process.

7.3.2(d)S Design and Development Input (ISO/TS 16949)

Device and process simulation models are reviewed periodically for robustness in accordance with Design Development and Qualification Procedure <F01-002.1>.

The customer product life cycle is considered for new products. When a technology or process is identified as obsolete, the customer is notified to develop a plan for obsolescence.

7.3.2.1 Product Design Input (ISO/TS 16949)

Design Development and Qualification Procedure <F01-002.1> establishes the requirements for identification, documentation and review of design input requirements, including the following:

- a) customer requirements such as special characteristics;
- b) information pertaining to previous designs, competitor analysis, supplier feedback, etc.;
- c) targets for product quality, life, reliability, durability, maintainability, timing and cost.

7.3.2.2 Manufacturing Process Design Input (ISO/TS 16949)

Spancion memory and Spancion memory FMO/APT document and review the development input requirements in accordance with Technology Development, Qualification, and Change Management Process <F01-002.2> and Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>. These inputs include

- a) product design output data,
- b) targets for productivity, process capability and cost,
- c) customer requirements, if any, and
- d) experience from previous developments.

7.3.2.3 Special Characteristics (ISO/TS 16949)

Spancion identifies special characteristics for processes and product and

- a) includes all special characteristics in the control plan,
- b) complies with customer-specified definitions and symbols, and
- c) identifies process control documents including drawings, FMEAs, control plans, and operator instructions with the customer's special characteristic symbol or an equivalent symbol or notation.

7.3.3 Design and Development Outputs

The output of design and development is in suitable form to enable verification against the design and development input and approval prior to release. Design and development outputs

- a) meet the input requirements,
- b) provide appropriate information for purchasing and production,
- c) establish product acceptance criteria, and
- d) specify the characteristics of the product essential for its safe and proper use.

7.3.3S Design Output (ISO/TS 16949)

Data demonstrates that device packaging and transportation packing meet customer requirements.

7.3.3.1 Product Design Outputs – Supplemental (ISO/TS 16949)

Spansion memory product design output is expressed in terms that can be verified and validated against the input requirements in accordance with Design Development and Qualification Procedure <F01-002.1>. Product design output includes

- a) design FMEA, reliability results,
- b) product special characteristics and specifications,
- c) product error – proofing where appropriate,
- d) product definition including drawings or mathematically based data,
- e) product design reviews results, and
- f) diagnostic guidelines, where applicable.

7.3.3.2 Manufacturing Process Design Output (ISO/TS 16949)

The design of processes used to manufacture Spansion memory products is expressed in terms that can be verified against the design inputs and validated in accordance with Technology Development, Qualification, and Change Management Process <F01-002.2> and Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>. The manufacturing design output includes

- a) specifications and drawings,
- b) process flow chart/layout,
- c) manufacturing process FMEAs,
- d) control plan,
- e) work instructions (process specifications and operator instructions),
- f) process approval acceptance criteria,
- g) data for quality, reliability, maintainability and measurability,

- h) results of error-proofing activities as appropriate, and
- i) methods of rapid detection of product/process nonconformities.

7.3.3.2S PFMEA (ISO/TS 16949)

PFMEAs for Spansion memory products pertain to all processes from receipt of material from supplier to the shipment of product to customers. Reference Technology Development, Qualification, and Change Management Process <F01-002.2> and Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>.

The tools needed to ensure error-proofing are in place to prevent mixed material, wrong labeling, and other issues common to logistics and storage and shipping of products. Spansion uses family FMEAs for products using the same processes and packaging.

7.3.4 Design and Development Review

The design and development project team leader arranges reviews based on the project schedule. The team members and /or management are selected for the review based on the functional concerns of the design and development stage. The purpose of these reviews is

- a) to evaluate the ability of the results of the design and development to meet requirements, and
- b) to identify any issues requiring action and propose the action needed to correct the issue.

Spansion memory design engineering and Spansion memory FMO/APT hold formal reviews as defined in Technology Development, Qualification, and Change Management Process <F01-002.2>, Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>, and Design Development and Qualification Procedure <F01-002.1>.

Records of design reviews are maintained in accordance with Records Management Policy <F00-014>.

7.3.4.1 Monitoring (ISO/TS 16949)

Measurements at specific stages of design and development are defined, analyzed, and reported with summary results as inputs to management review in accordance with Spansion Operations Functions and Key Processes <F01-001.1>, Management Responsibility <608-QR006>, and FMO Management Review Procedure <F08-023>.

7.3.5 Design and Development Verification

Design and development verification is conducted in accordance with Design Development and Qualification Procedure <F01-002.1>. These verifications ensure that the output of the design stage conforms to the required inputs for the product. Records of the results of the verification and any necessary actions are maintained in accordance with Records Management Policy <F00-014>.

7.3.5S Design and Development Verification (ISO/TS 16949)

The wafer processes used to manufacture Spansion memory product are characterized for the corners of the process or in accordance with customer requirements. Spansion, when required by contract for a new design verification,

- a) obtains customer approval for design and process characterization,
- b) obtains customer approval for certified test applications, and
- c) supplies engineering samples for evaluation in the application.

Reference Design Development and Qualification Procedure <F01-002.1>, Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>, Technology Development, Qualification, and Change Management Process <F01-002.2>, and Product Engineering Development, Qualification and Change Management Process <F01-002.4>.

Records for these verifications are maintained in accordance with Records Management Policy <F00-014>.

7.3.6 Design and Development Validation

Product Management Policy <F00-002> addresses the requirements for design and development validation (qualification) to ensure the resulting product or process is capable of meeting requirements for the specified application. Wherever practical, the qualification is performed prior to delivery.

Records of the validation tests are maintained in accordance with Records Management Policy <F00-014>.

7.3.6.1 Design and Development Validation – Supplemental (ISO/TS 16949)

Spansion memory design engineering performs validation (qualification) testing to customer requirements, as required by contract or agreement, as defined in Product Engineering Development, Qualification and Change Management Process <F01-002.4>.

7.3.6.1S Design and Development Validation (ISO/TS 16949)

Spansion memory design engineering and Spansion memory FMO/APT perform validation (qualification) testing in accordance with Product Engineering Development, Qualification and Change Management Process <F01-002.4> and Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>, respectively. For initial products on new technologies, and where necessary on other products, MG and NVT ensure that process / product corner lots have been characterized in accordance with Technology Development, Qualification, and Change Management Process <F01-002.2>, Product Engineering Development, and Qualification and Change Management Process <F01-002.4>. Spansion memory FMO/APT conducts manufacturability studies and process characterization on new packages and materials as described in Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>.

7.3.6.2 Prototype Programme

Spansion provides engineering samples in lieu of prototypes in accordance with Product Engineering Development, Qualification and Change Management Process <F01-002.4> and Product Management Policy <F00-002>. Spansion memory FMO/APT uses engineering samples as a means of characterizing packages and processes as described in Final Manufacturing Operations Development and Qualification Procedure and Change Management Process <F01-002.3>.

7.3.6.3 Product Approval Process (ISO/TS 16949)

Spansion utilizes a disciplined Production Part Approval Process (PPAP) for customers requiring this type of communication process as described in Production Part Approval Process <F01-001.2>. This PPAP procedure ensures that customers have the opportunity to approve the product qualification plans, as well as concur with problem analysis and resulting corrective and preventive actions, all of which are included in the PPAP submission to the customer. Spansion follows Product Management Policy <F00-002> for validation including reliability.

This product and manufacturing process approval procedure is also applied to suppliers in accordance with Supplier Quality Policy <F00-037>.

Records of validation results are maintained in accordance with Records Management Policy <F00-014>.

7.3.7 Control of Design and Development Changes

All design changes and modifications are identified, documented, reviewed and approved before implementation in accordance with Product Management Policy <F00-002>. Records

of the results of the review of changes and any necessary actions are maintained in accordance with Records Management Policy <F00-014>.

7.3.7S Control of Design and Development Changes (ISO/TS 16949)

Spansion memory design engineering and Spansion memory FMO/APT notify customers of all major design or process changes in accordance with Change Notification Policy <F00-023> and submit revised PPAPs to ISO/TS 16949 sensitive customers as required in Spansion Operations Functions and Key Processes <F01-001.1>. When making design changes, Spansion considers the expected impact on form, fit, function, and system performance in which the product is used. When product obsolescence is planned, customers are notified as defined in Product Obsolescence Policy <F00-097>.

7.4 Purchasing

7.4.1 Purchasing Process

The GSM organization is authorized to commit corporate funds for the purchase of equipment, material and services for Spansion. Authorization to commit corporate funds is defined in Corporate Purchasing Policy – Purchasing Authority <F00-1000>.

GSM is authorized to purchase controlled materials and services from approved suppliers to ensure that purchased product conforms to specified requirements. Selection of suppliers is based on Supplier Quality Policy <F00-037> and Procedure for Auditing Service Suppliers <F01-009> and documented on approved supplier lists. Records of the evaluation and selection process for suppliers are maintained in accordance with Records Management Policy <F00-014>.

7.4.1S Purchasing Process (ISO/TS 16949)

When qualification testing or failure analysis is outsourced, any customer specific requirements are passed on to the supplier.

7.4.1.1 Statutory and Regulatory Conformity (ISO/TS 16949)

Purchased material satisfies all governmental, environmental, and safety constraints, as required, in accordance with “Terms and Conditions” specified in purchase orders.

7.4.1.2 Supplier Quality Management System Development (ISO/TS 16949)

GSM works with all direct material suppliers for Spansion memory product to deploy the requirements of ISO/TS 16949 with the goal of supplier compliance to said standard.

Where the supplier is not in full compliance, GSM and engineering work with the supplier with the intent of conformity to ISO/TS 16949 in accordance with Supplier Quality Policy <F00-037>. Third party registration to ISO 9001 is the first step in achieving this goal.

7.4.1.2S Supplier Quality Management System Development (ISO/TS 16949)

For fabrication, assembly, and/or test, suppliers of single power supply Flash memory product, compliance to ISO/TS 16949 is required. Reference Quality Requirements for Spansion Final Manufacturing Subcontractors <F03-070> and Quality Management System Requirements for Foundries <F03-146>. This may be verified by:

- Third party registration to ISO/TS 16949
- Customer conducted or approved audits

7.4.1.3 Customer – Approved Sources (ISO/TS 16949)

If contractually agreed upon, GSM purchases materials from customer-approved suppliers in accordance with Procurement System <F01-092>. Suppliers are approved internally and added to Approved Suppliers – Materials <F03-001> and <03-001.X>, as applicable, with a notation for “limited usage.”

7.4.2 Purchasing Information

The initiation of purchasing information, approval and completion of purchasing activities is defined in Procurement System <F01-092>.

Purchasing information describes the product to be purchased, including where appropriate

- a) requirements for the approval of product, procedures, processes, and equipment,
- b) requirements for qualification of personnel, and
- c) quality management system requirements.

7.4.3 Verification of Purchased Product

Methodologies to ensure purchased product meets specified requirements are defined in Supplier Quality Policy <F00-037>. If a customer intends to perform verification at a supplier’s premises, this is handled in accordance with Supplier Quality Policy <F00-037>.

7.4.3.1 Incoming Product Conformity to Requirements (ISO/TS 16949)

Various methods are established to assure the quality of purchased product as defined in Supplier Quality Policy <F00-037>.

7.4.3.1S Incoming Product Quality (ISO/TS 16949)

“04” specifications define the material characteristics that are significant to product and processes. Supplier data that is used as a control method meets the requirements of Supplier Quality Policy <F00-037>.

7.4.3.2 Supplier Monitoring (ISO/TS 16949)

Supplier performance is monitored in accordance with Supplier Quality Policy <F00-037>.

7.5 Production and Service Provision

7.5.1 Control of Production and Service Provision

Production processes are conducted under controlled conditions including: documented work instructions/process specifications, process monitoring, special working environments, adequate production equipment, and workmanship standards. Management is responsible for ensuring that the following process control provisions are implemented.

- a) Where needed in the process, information that describes the characteristics of the product is available. These characteristics are covered in the process specification.
- b) Process specifications and work instructions are documented in accordance with the Specification System <F01-008> and contain clear and complete instructions appropriate to the circumstances. These work instructions also provide the criteria for acceptable quality performance or criteria.
- c) Processes and equipment are reviewed for adequacy and appropriateness, approved by relevant personnel prior to usage, and subject to re-evaluation for continued acceptability. Environmental conditions in which processes are performed and equipment is used are controlled in accordance with Atmosphere Quality Levels <F16-022> and DI Water/UPW Limits <F16-023>.
- d) The use of monitoring and measuring equipment is controlled in all processes by “05”, “06” or “07” specifications as defined in Specification System <F01-008>.
- e) Each process area monitors and controls critical in-process parameters and product characteristics with specified requirements to determine the acceptability of work and products, and the resultant corrective actions taken in connection with any nonconformance.
- f) Final In-line Quality Inspection <F06-027> and Physical Distribution Quality Inspection Requirements <F06-001 ensure that final inspection and test activities are completed and acceptable prior to product release for shipment and any associated data and records complete and approved. Actions required for field issues pertaining to product nonconformity are controlled by Customer Corrective Action Request (CCAR) System

<F01-022>, and Customer Corrective Action Request (CCAR) and FA Support Procedure <608-QR023>.

7.5.1.1 Control Plan (ISO/TS 16949)

Control Plans are used for all Spansion memory manufacturing. Control Plans are maintained in accordance with Technology Development, Qualification, and Change Management Process <F01-002.2>, Assembly Process Flow Charts and Control Plan <02-001>, and Spansion TMP Process Flow and Control Plan <F02-028>. The control plan

- a) lists the process controls used in manufacturing,
- b) includes monitoring methods of control exercised over special characteristics,
- c) includes contractual customer requirements, and
- d) defines the reaction plan needed for process unstableness.

Control plans are reviewed when changes may occur to the product, manufacturing process, logistics, supply sources or FMEA.

7.5.1.1S Control Plan (ISO/TS 16949)

Control plans for Spansion memory product include the methods for controlling all processes from receipt of material to shipping.

7.5.1.2 Work Instructions (ISO/TS 16949)

Work instructions are prepared and controlled by the Specification System <F01-008>. The documents are developed during the design and development process for the manufacturing process.

7.5.1.2S Work Instructions (ISO/TS 16949)

Work instructions include requirements for test equipment and the supporting software and hardware, data entry requirements, and golden units and usage frequency.

7.5.1.3 Verification of Job Set-Ups (ISO/TS 16949)

Job setups are verified in accordance with local area procedures to ensure product meets all requirements.

7.5.1.4 Preventive and Predictive Maintenance (ISO/TS 16949)

Areas are required to have preventive maintenance procedures as specified in minimum area requirements specifications <F01-12X>. MGM/MSD Preventive & Predictive Maintenance System <F01-226> provides the methodology for developing a planned preventive maintenance system including methods for predictive maintenance.

7.5.1.5 Management of Production Tooling (ISO/TS 16949)

Spancion has established and implemented a system for tooling management as specified in Assy & TMP Tooling Management System <F01-122> and minimum area requirements specifications <F01-12X>.

7.5.1.5S Management of Production Tooling (ISO/TS 16949)

Tooling Management as described in the documents listed in sections 7.5.1.4 and 7.5.1.5 cover the following equipment: probe cards, tester contactors, device handling, test fixtures, software, testers, photo mask/mask sets, wire bond capillaries, trim and form and singulation tools, and molds.

The above methodology addresses the effectiveness for: operation efficiency, maintenance schedule, maintenance adjustment consistent with equipment utilization, and tool change program for perishable tools.

7.5.1.6 Production Scheduling (ISO/TS 16949)

Production scheduling is performed in accordance with corporate systems, Spancion Operations Functions and Key Processes <F01-001.1>.

7.5.1.7 Feedback of Information from Service (ISO/TS 16949)

Spancion memory product does not require servicing. Therefore, this clause is not applicable.

7.5.1.8 Service Agreement with Customer (ISO/TS 16949)

Spancion memory product does not require servicing. Therefore, this clause is not applicable.

7.5.2 Validation of Processes for Production and Service Provision

Processes whose results cannot be fully verified by subsequent product inspection and testing, and where processing deficiencies may not become apparent until the product is in use, are continuously monitored to ensure compliance with specified requirements.

To ensure product quality and reliability of such processes, two levels of process monitoring are performed.

In-line process monitoring and testing (such as electrical, functional testing and wafer level reliability tests) are performed at defined points in the process flow. Operations managers ensure that required monitoring is performed, and that monitoring results and associated corrective action are recorded and maintained, as documented in local manufacturing specifications. The selection of equipment for these processes is determined during the process planning stage to ensure compliance with process requirements. Personnel performing these processes are trained in accordance with Corp. Manufacturing Training System <F01-210>. These processes are controlled as defined in the control plan and/or manufacturing process specifications <05-XXX>. Any change that may affect form, fit, function or reliability is revalidated in accordance with Product Management Policy <F00-002>.

Process qualification testing is conducted on new products, packages, wafer fabrication and assembly processes in accordance with Product Management Policy <F00-002>. Reliability management at each facility is responsible for ensuring that the monitors and tests are performed, as specified, and test results recorded and maintained in accordance with Records Management Policy <F00-014>.

7.5.2.1 Validation of Processes for Production and Service Provision – Supplement (ISO/TS 16949)

All manufacturing processes used for Spansion memory product are validated in accordance with Product Management Policy <F00-002>.

7.5.3 Identification and Traceability

Spansion provides lot numbering and part numbering systems, which meet the requirements for product identification and traceability as documented in Spansion Product Traceability Policy <F00-038>.

WISE (Worldwide Inventory for Spansion Excellence) is the lot data collection system. Camstar is the site Work In Process (WIP) system. WISE, Camstar, and any other equivalent tracking system identify and track all production lots from wafer fab through customer shipment. The lot number control system, as defined in Spansion Lot Numbering System <F01-080>, provides complete lot history for any given lot.

Additional trace information is provided via the Spansion Date Code System <F16-006> and SAP.

Area specifications require product to be uniquely identified and traceability data to be recorded as part of area processing records. Records are maintained in accordance with Records Management Policy <F00-014>.

7.5.3S Identification and Traceability (ISO/TS 16949)

The system defined in section 7.5.3 is capable of doing a trace forward and backward within 24 hours. It covers product lots, processes and materials to satisfy customer needs for risk abatement and containment.

7.5.3.1 Identification and Traceability – Supplemental (ISO/TS 16949)

The above system for identification and traceability address the requirements for all product and processes at Spansion.

7.5.4 Customer Property

Customer property considers two areas. The first pertains to intellectual property pertaining to product design and development. The business unit controls this property. This information is transferred into specifications for production and testing. The second area of customer property pertains to materials. Normally Spansion does not accept customer-owned material. However, where it is necessary to comply with contractual requirements, Spansion has established the process for controls in Procurement System <F01-092>. If any customer property is lost, damaged or otherwise found to be unsuitable for use, this is reported to the customer and records maintained in accordance with Records Management Policy <F00-014>.

7.5.4S Customer Property (ISO/TS 16949)

Spansion customer property, which includes material, product or software, is controlled in accordance with Spansion Operations Functions and Key Processes <F01-001.1>. Customer – supplied product traveling between locations is handled in accordance with para. 7.5.5.

7.5.4.1 Customer – Owned Production Tooling (ISO/TS 16949)

Spansion does not utilize customer-owned tools and equipment.

7.5.5 Preservation of Product

Spansion subscribes to documented procedures for handling, storage, packaging, preservation and delivery to preserve the conformity of product and to prevent damage and deterioration. These procedures are documented in the appropriate material, processing, and operating specifications.

- a) Handling: Area management documents handling requirements in area specifications to prevent damage or deterioration of product. This is accomplished by adhering to the procedures in specifications such as Wafer Handling and Storage Outside Fab <F00-033> and Incoming Material Control <F03-005>.

Work-in-process product is packed appropriately in accordance with Packaging and Orientation Standard for Spansion <F16-017> and product is shipped in compliance with Shipping Labeling Requirement <F16-050>. Handling Procedure for Prevention of ESD Damages <F00-016> describes the policy for safe handling of materials susceptible to electrostatic discharge (ESD) damage. This ESD policy is implemented from wafer sort on.

- b) Storage: After received material has been verified against the purchase order and inspected, it is stored in designated secured storage areas to prevent damage or deterioration. The condition of product in storage is assessed at appropriate intervals in accordance with Inventory Storage Requirements <F01-142>.

Documented storage procedures define storage requirements to prevent damage or deterioration of product pending use or delivery. Storage requirements are defined in minimum area requirements specifications <F01-12X>.

- c) Packaging, Protection, Preservation and Identification: Spansion ensures controls are in place for the packing of product to the extent necessary to ensure conformance to specified internal and external requirements.

Packaging and Orientation Standard for Spansion <F16-017> defines the packing method for all finished product, which includes materials to be used, quantity per container, and unit orientation. Wafers are packed in accordance with Wafer Pack and Ship Standard <16-201>.

Shipping and labeling requirements are specified in Shipping Labeling Requirement <F16-050> and the Container Label Requirement <F16-054>. Matl Ship & Intercompany Rec. <07-119> covers wafer shipments worldwide. Packing procedures ensure that product is packed in accordance with Handling Procedure for Prevention of ESD Damages <F00-016> and meets any special packing required by the customer.

The proper environment for preservation of product is maintained from product start to the customer. Environmental constraints are defined in minimum area requirements specifications <F01-12X>.

- d) Delivery: Product verification and inspection processes specified in Spansion TMP Process Flow and Control Plan <F02-028>, Physical Distribution Quality Inspection Requirements <F06-001>, and Final In-line Quality Inspection <F06-027> ensure that product complies with processing, test and inspection requirements and is acceptable for shipment.

The arrangement for the protection of the quality of product after final inspection and test is described in each distribution center's procedures, e.g., Boxstock Sales Order Preparation <07-064>. Requirements for warehousing, processing and inspecting product are defined. Where contractually specified, this protection may extend to include delivery to destination.

7.5.5.1 Storage and Inventory (ISO/TS 16949)

The inventory management system optimizes inventory turnover time by using a FIFO methodology. This system assures stock rotation and minimizes inventory levels in accordance with Spansion Operations Functions and Key Processes <F01-001.1>.

The responsible manager for each inventory area is responsible for assessing the condition of the stored material in accordance with Inventory Storage Requirements <F01-142>. This will include detection for deterioration of the product or identification/labeling.

Obsolete product is managed in accordance with Product Obsolescence Policy <F00-097>.

7.5.5.1S Storage and Inventory (ISO/TS 16949)

Product inventory for work in process (WIP) is managed using actual vs. theoretical cycle time. This is built into the planning system for all stages of manufacturing.

7.6 Control of Monitoring and Measuring Equipment

The design and development teams for product and process determine the needed controls to ensure product quality. The selection of equipment for monitoring and measuring product and process quality are a function of the design and development teams specified in Product Management Policy <F00-002>. Where necessary to ensure valid results, measuring equipment is

- a) calibrated,
- b) adjusted or readjusted as necessary,
- c) identified to enable the calibration status to be determined,
- d) safeguarded from adjustment that would invalidate the measurement, and

- e) protected from damage and deterioration during handling, maintenance and storage in accordance with Calibration Policy <F00-015> and Control of Monitoring and Measuring Devices <608-OP031>.

Requirements for out of tolerance condition and the need to take appropriate action for product that was evaluated during this period of out of tolerance are specified in Calibration Policy <F00-015> and Control of Monitoring and Measuring Devices <608-OP031>. Records are maintained in accordance with Records Management Policy <F00-014>.

7.6S Control of Monitoring and Measuring Devices (ISO/TS 16949)

Where golden units are used, the requirements of Calibration Policy <F00-015> and Control of Monitoring and Measuring Devices <608-OP031> are adhered to.

7.6.1 Measurement System Analysis (ISO/TS 16949)

The requirements for measurement system analysis are specified in minimum area requirements specifications <F01-12X> and performed in accordance with Measurement Systems Analysis (MSA) <F01-025.6>, and Fab 25 Measurement Systems Analysis (MSA) <307-8464>.

7.6.1S Measurement System Analysis (ISO/TS 16949)

The selection of measuring and monitoring equipment for Spansion memory product considers the resolution of the equipment used to monitor special characteristics. Where technically possible, the equipment will be one-tenth of the total process six sigma standard deviation.

7.6.2 Calibration / Verification Records (ISO/TS 16949)

Records for calibration/verification activity are specified in Calibration Policy <F00-015> and Control of Monitoring and Measuring Devices <608-OP031> and also addressed in detailed equipment calibration procedures for local recall groups "X13-010." These procedures address

- a) equipment identification, including the reference standards used for calibration,
- b) revisions following engineering changes
- c) any out of specification readings as received,
- d) an assessment of the impact of out of tolerance condition,
- e) statement of conformity to specification after calibration, and
- f) notification to the customer if suspect product or material has been shipped.

7.6.3 Laboratory Requirements (ISO/TS 16949)

7.6.3S Laboratory Requirements (ISO/TS 16949)

Internal and external laboratories used to verify, validate, or test Spansion memory product are capable, where required, of performing the tests required in AEC – Q100.

7.6.3.1 Internal Laboratory (ISO/TS 16949)

In-house laboratory facilities have a documented scope, which includes the specific tests, evaluations, and calibrations it has the ability and competency to perform and a list of the equipment, methods, and standards utilized in the laboratory. These facilities control the laboratory as follows:

- a) laboratory personnel are qualified to perform their specific job duties based on their background and experience,
- b) laboratories have documented procedures for the receipt, identification, handling, protection and retention or disposal of test samples and/or calibration equipment items,
- c) laboratories monitor, control, and record environmental conditions, as specified in area procedures, and
- d) records are maintained in accordance with Records Policy <F00-014>.

In-house laboratories use test and/or calibration methods, which meet the needs of the customer and are appropriate for the test and/or calibrations it performs, including current international, regional, or national standards. Appropriate statistical techniques are applied to in-house laboratory verification activities whose deliverables are data.

7.6.3.1S Internal Laboratory (ISO/TS 16949)

The laboratory when using production equipment and/or processes clearly identifies these in their procedure/scope.

7.6.3.2 External Laboratory (ISO/TS 16949)

External laboratories are accredited by a nationally recognized accreditation body as specified in Procedure for Auditing Service Suppliers <F01-009>.

8.0 MEASUREMENT, ANALYSIS AND IMPROVEMENT

8.1 General

Spancion plans and implements the monitoring, measurement, analysis and improvement processes during the design and development phase of product and process realization to demonstrate conformity to product requirements. Quality objectives are defined by top

management and supported by the individual functional departments to ensure conformity of the quality management system. Top management and the supporting functional departments review data from the results of the monitors and measurements for the quality objectives to continually improve the effectiveness of the quality management system.

Statistical Process Control (SPC) is a key component of Spancion's efforts to continually improve product quality and reliability.

SPC at Spancion relies on prevention rather than inspection to achieve conformance with requirements, reduce variation around a target, and reduce the costs of production. SPC programs are decentralized, delegated and customized, as appropriate. Continual improvement through the use of SPC is a responsibility and expectation placed on each division. Customer focus, defect and cost reduction, yield enhancements, and capability improvement are represented within interrelated divisional programs.

SPC charts monitor critical process parameters. The natural limits and capability of the process are established by statistical analysis of manufacturing data. These natural limits form the basis for control charts. The relationship of the inherent process variation to the product specification limits determines the process capability.

The SPC system provides verification that the process is in control, thereby assuring stable processes and avoiding unnecessary adjustments. Prompt action is taken when control chart patterns signal warnings, and causes of atypical behavior are identified and removed. SPC requirements are specified in Statistical Process Management <F00-066>. Documented procedures permit the effective control of the processes and the discovery of the root causes of excessive variation.

8.1.1 Identification of Statistical Tools (ISO/TS 16949)

Statistical tools for each process are determined during advanced product quality planning and are included in the control plan.

8.1.2 Knowledge of Basic Statistical Concepts (ISO/TS 16949)

Training in the application of statistical tools and statistically designed experiments is considered important in the overall program to increase productivity. Spancion believes the development of statistical thinking among employees promotes continual process improvements and drives increased productivity, quality, and reliability.

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

As one of the measurements of performance of the quality management system, Spansion has established a system to monitor information relating to customer perception as it relates to meeting customer requirements. Trends in customer satisfaction are determined in accordance with Customer Satisfaction Measurement <F01-224>. These trends are compared to those of competitors, or appropriate benchmarks, and reviewed by upper management.

Functional departments are responsible for determining the need to monitor feedback from internal business partners as part of their overall continual improvement program.

8.2.1.1 Customer Satisfaction – Supplemental (ISO/TS 16949)

The process defined in Customer Satisfaction Measurement <F01-224> provides a methodology for the continual evaluation of customer perception. Spansion's internal processes address the evaluation of the realization process performance. The performance indicators are based on the planned requirements defined in the control plans and the requirements for QMP Procedure <F01-002.18>. Performance indicators are established for

- a) delivered part quality performance,
- b) customer disruptions including field returns,
- c) delivery schedule performance (including incidents of premium freight), and
- d) customer notifications related to quality or delivery issues.

Customer Corrective Action Request (CCAR) System <F01-022>, Customer Corrective Action Request (CCAR) and FA Support Procedure <608-QR023>, and Corporate Returns Policy <F00-010> evaluate field issues and determine Spansion's performance and effectiveness for product delivered to the customer.

The delivery schedules for customer shipments and receipt of material are critical to the company's success. These issues are monitored in accordance with Physical Distribution and Global Logistics Supplier Evaluation Process <F03-072> and Spansion Operations Functions and Key Processes <F01-001.1>. All customer requirements, including lead-time, transportation mode, routings and containers are adhered to. Records of Spansion responsible premium freight are maintained in accordance with Physical Distribution and Global Logistics Supplier Evaluation Process <F03-072>.

Customer notification for the on-line transmittal of advance shipment notifications is defined in Contract Review Process & Support Responsibility for Field Sales and Global Customer Service <F01-045>. Where the customer elects to use a computerized system,

the Electronic Data Interchange (EDI) system is available. However, where EDI is not used, an alternate method is available.

8.2.2 Internal Audit

The Corporate Audit and Assessment Policy <F00-007> identifies the various types of audit and assessment processes utilized at Spansion. The internal audit process ensures the implementation and effectiveness of the quality management system. Elements of the quality management system are addressed during regularly scheduled area/process audits in accordance with Worldwide Quality Systems Audit <F01-019> and Internal Audits <608-QR018>.

Audits are scheduled on the basis of the status and importance of the activity and are performed by auditors who are selected, trained, and certified according to documented criteria. Auditors do not audit their own work.

Audit results are documented and communicated. Feedback on strengths, weaknesses, and opportunities for improvement are presented to area personnel having the authority to effect positive change. Serious deficiencies result in a corrective action request in accordance with the Corrective Action System <F01-020> and Corrective and Preventive Action <608-QR007>. Follow up activities verify and record the implementation and effectiveness of any corrective actions taken.

Internal auditing covers all shifts and is conducted according to an audit plan/schedule updated annually. When internal/external nonconformances or customer complaints occur, the planned audit frequency is increased in accordance with Worldwide Quality Systems Audit <F01-019> and Internal Audits <608-QR018>.

Audit records are maintained in accordance with Records Management Policy <F00-014>.

8.2.2S Internal Audit (ISO/TS 16949)

The audit program includes

- a) clean room controls,
- b) ESD controls,
- c) proper handling of masks, wafers, gases, and product
- d) corrective actions and effective implementation required from problem analysis reports, and
- e) timely completion of analysis reports including containment, verification, and root cause and corrective action identification.

8.2.2.1 Quality Management System Audit (ISO/TS 16949)

Audit and assessment is responsible for conducting internal audits in accordance with Worldwide Quality Systems Audit <F01-019> and Internal Audits <608-QR018> to ensure quality management system requirements are being followed.

8.2.2.2 Manufacturing Process Audit (ISO/TS 16949)

These types of audits are performed in manufacturing in accordance with Worldwide Quality Systems Audit <F01-019>.

8.2.2.3 Product Audit (ISO/TS 16949)

Product audits are conducted in accordance with Corporate Audit and Assessment Policy <F00-007>. In addition, Spansion has established monitors in the control plans to audit the products at various steps of the process. These product audit processes are audited by WQSA (Worldwide Quality Systems Audit) to ensure the requirements are followed and that the data reported is accurate.

8.2.2.4 Internal Audit Plans (ISO/TS 16949)

Internal audit covers all quality management related processes, activities and shifts, and are scheduled according to an annual plan in accordance with Worldwide Quality Systems Audit <F01-019> and Internal Audits <608-QR018>.

8.2.2.5 Internal Auditor Qualification (ISO/TS 16949)

Auditors who perform audits to the requirements of ISO/TS 16949 are qualified in accordance with WQSA Training <F01-019.4> and Internal Audits <608-QR018>.

8.2.3 Monitoring and Measurement of Processes

During the design and develop stages, the project team measures the progress of the project and reports status to management. This team also establishes the requirements for pre-production and manufacturing stages, including special characteristics for the processes and monitors for manufacturing which are included on control plans. This data is reported at Management Review meetings.

All other core processes that comprise the quality management system, including support processes, are monitored and measured by process owners to ensure quality objectives are met. The data from the quality management system processes are analyzed against planned results and where planned results are not achieved, correction and corrective action, as appropriate, is taken by management to resolve the issue.

8.2.3.1 Monitoring and Measurement of Manufacturing Processes (ISO/TS 16949)

Process capability or performance levels approved via PPAP are maintained and improved upon by implementing control plans and monitoring SPC levels. Significant process events are appropriately noted and recorded. Control plans are maintained in accordance with Fab Process Technology Development, Qualification and Change Management Process <F01-002.2>, Assembly Process Flow Charts and Control Plan <02-001>, and Spansion TMP Process Flow and Control Plan <F02-028>.

Statistical process control procedures for specific areas require significant events to be recorded. Reaction plans are included in the control plan for the family of product/package or individual product.

Specification System <F01-008> and Controlled Specification and Distribution Process <F08-2001> maintain the records for process changes.

8.2.4 Monitoring and Measurement of Product

Monitors and measurements for the product and the material used in the manufacturing and shipping of the product are established to ensure the product meets requirements. These monitors and measurements start at the beginning of the product realization process (design and development) through the manufacturing and shipping processes.

The criteria for these requirements reside in the following documents:

Process specification	05-XXX
Operator instructions	07-XXX
Inspection instructions	06-XXX
Control Plans and Flow Charts	02-XXX
Project Plans for new products	

Records indicate the person authorizing the release of product for delivery to the customer and are maintained in accordance with Records Management Policy <F00-014>.

Product is not released until satisfactory completion of the planned arrangements. Any deviation from this requirement requires a Decision Record in accordance with Decision Record System <F01-018>.

8.2.4S Monitoring and Measurement of Product (ISO/TS 16949)

Where Spansion memory products require inspection, management and engineering have established processes that provide for the

- appropriate lighting for the evaluation,
- appropriate visual aids,
- adequate inspection aids and evaluation equipment, and
- competent personnel for performing the verification.

Stress testing methods used to improve product reliability have been proven to not cause any degradation of the product. This data resides with the Spansion memory engineering department.

Where guardbanding methods are used to test Spansion memory products and this is used to omit test compliance, Spansion memory engineering maintains documented statistical data to justify these guardbanding methodologies. Where guardband limits are used to eliminate customer specified electrical test parameters, statistical data is maintained that provides as good or better risk for the customer as a Cpk of 1.67 would provide. This data is maintained by the Spansion memory engineering department.

8.2.4.1 Layout Inspection and Functional Testing (ISO/TS 16949)

Layout inspections and functional verifications are performed if specifically required by the customer in accordance with Production Part Approval Process <F01-001.2>.

8.2.4.2 Appearance Items (ISO/TS 16949)

This clause is not applicable to Spansion memory product.

8.3 Control of Nonconforming Product

The Decision Record System <F01-018> describes the process for the review and control of nonconforming product. These specifications ensure that product that does not meet specified criteria is clearly identified and segregated to prevent the inadvertent mixing and shipment. These procedures consider the method for dealing with nonconforming material by taking action to eliminate the detected nonconformance, by authorizing its use, release or acceptance under concession by a relevant authority and where applicable, by the customer, and by taking action to preclude its original intended use or application.

Records of the nature of nonconformities and any subsequent actions taken, including concessions obtained, are maintained in accordance with Records Management Policy <F00-014>. Where a nonconformity is noted after delivery of the product to the customer, Spansion takes action appropriate to the effect, or potential effects, of the nonconformity in accordance with Customer Advisory System <F01-156> and Decision Record System <F01-018>.

8.3.1 Control of Nonconforming Product – Supplemental (ISO/TS 16949)

Spancion's processes do not allow unidentified or suspect material to continue processing unless it has been dispositioned in accordance with Decision Record System <F01-018>.

8.3.1S Control of Nonconforming Product – Supplemental (ISO/TS 16949)

Nonconforming product is identified and immediately placed in a status that prevents reintroduction into the production flow.

8.3.2 Control of Reworked Product (ISO/TS 16949)

Rework to meet specified requirements is determined by Worldwide Returns Processing Procedure <F07-098>, Standard Processing Specification <F00-004>, and area process specifications. Allowable rework is documented and remains with the production lot traveler. Repaired and reworked product is reinspected in accordance with documented procedures.

Rework instructions are accessible and utilized by the appropriate personnel in their designated work areas. Visible rework on the exterior of the product is not permitted.

8.3.2S Control of Reworked Product (ISO/TS 16949)

Where a process is developed for reworking product, the requirements that were established for qualification of the initial process are performed to ensure compliance of the rework method.

8.3.3 Customer Information (ISO/TS 16949)

The Spancion Customer Representative is responsible for establishing a process for customer notification in the event that nonconforming product is shipped. Should such an event occur, customers are notified promptly in accordance with the guidelines set forth in Customer Advisory System <F01-156>.

8.3.4 Customer Waiver (ISO/TS 16949)

Whenever the product or process is different from that which is currently approved, prior customer authorization is obtained in accordance with Spancion Operations Functions and Key Processes <F01-001.1>.

8.4 Analysis of Data

- a) Management when establishing quality objectives selects the evaluation and analysis methods needed to determine the suitability and effectiveness of the quality management

- system and supporting processes. The evaluation and analysis of data provides information relating to customer satisfaction,
- b) conformity to product requirements,
 - c) characteristics and trends of processes and product including opportunities for preventive action, and
 - d) suppliers.

The data used to make decisions pertaining to continual improvement may be from internal or external sources.

8.4.1 Analysis and Use of Data (ISO/TS 16949)

Spancion data analysis addresses trends in quality and operational performance to compare the progress of actual results to the objectives. The analysis leads to action to support the following

- a) development of priorities for prompt solutions to customer - related issues;
- b) determination of key customer-related trends and correlation for status review, decision-making and longer term planning; and
- c) an information system for the timely reporting of product information arising from usage.

8.5 Improvement

8.5.1 Continual Improvement

Spancion continually improves the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review. The data that is collected from the various core processes is used by management to improve the effectiveness of the quality management system. This is achieved in management review meetings and other planning meetings held by top management.

The current standards of acceptability are continuously challenged through the Kaizen+ Program. This structured continuous improvement program facilitates the formation of collaborative projects, driven by cross-functional teams, to effectuate change.

The Quality Management Board (QMB), comprised of Executive Staff and other top management, is chartered with the responsibility to drive continual improvement in total quality management throughout the company. Some of the specific responsibilities include: reviewing and setting quality goals and policies; being the forum for employees to present

new ideas for achieving total quality management; reviewing quality metrics and key performance

indicators; reviewing the Quality Management System and reporting results to the CEO; directing activities of Kaizen+ team; and ensuring active participation by all organizations as the means to achieve change.

8.5.1.1 Continual Improvement of the Organization (ISO/TS 16949)

The necessary processes and methodologies for continual improvement are established through the global Kaizen+ Program. Breakthrough projects and incremental ongoing improvement activities are encouraged and reviewed by management in Kaizen+ Project Conferences.

8.5.1.2 Manufacturing Process Improvement (ISO/TS 16949)

Statistical Process Management <F00-066> and PPCD (proposed process change documents) teams address the requirements to continually focus upon control and reduction of variation in product characteristics and manufacturing process parameters.

8.5.2 Corrective Action

Spancion has documented procedures for implementing corrective action. These procedures are designed to eliminate the causes of nonconforming product. Changes to documented procedures resulting from corrective action are implemented and recorded.

Management allocates resources to identify and disposition nonconforming product, and to initiate analysis and corrective action to prevent recurrences. The Corrective Action System <F01-020> and Corrective and Preventive Action <608-QR007> define the system that documents actions taken to describe and resolve conditions adverse to product quality or service. Personnel performing these functions have defined responsibility, authority and organizational independence to identify and evaluate nonconformances, to initiate, recommend, and provide solutions, and to review the effectiveness of the actions taken. Supplier corrective action is handled in accordance with Material Review Board – Incoming Materials <F01-131>.

Records of corrective action are maintained in accordance with Records Management Policy <F00-014>.

Spancion provides customers several mechanisms to make inquiries, register concerns, and request failure analysis and corrective action. Personnel with customer responsibility are available to take and answer inquiries or forward them to appropriate personnel for resolution.

Customer Requests for F/A and CAR <F00-043>, Customer Corrective Action Request (CCAR) System <F01-022>, and Customer Corrective Action Request (CCAR) and FA

Support Policy <608-QR023> document the system for handling customer concerns. Controls are put in place to ensure corrective action has been taken and that it is effective.

8.5.2S Corrective Action (ISO/TS 16949)

Parts returned from a customer are analyzed in accordance with Customer Corrective Action Request (CCAR) System <F01-022>, Customer Corrective Action Request (CCAR) and FA Support Policy <608-QR023>, and TS 16949 Non Standard CCAR TAT <F01-022.2>. These procedures establish the requirements for

- containment in 24 hrs.
- problem verification within 48 hrs., and
- root cause identification and corrective action implementation within 10 calendar days.

8.5.2.1 Problem Solving (ISO/TS 16949)

The Eight Disciplines (8Ds) approach is used to resolve problems resulting from the Corrective Action System <F01-020>, Corrective and Preventive Action <608-QR007>, Customer Corrective Action Request (CCAR) System <F01-022>, and Customer Corrective Action Request (CCAR) and FA Support Policy <608-QR023>.

8.5.2.2 Error-Proofing (ISO/TS 16949)

In the course of the corrective action process, opportunities to implement error-proofing methodologies are considered and ultimately implemented whenever feasible. Opportunities for error-proofing are routinely discovered and implemented as part of corrective and preventive activities occurring throughout manufacturing. Reference Assembly & End of Line Quality Methodology <F01-025> and Wafer Fabrication Area Requirements <F01-124>.

8.5.2.3 Corrective Action Impact (ISO/TS 16949)

Corrective actions are implemented to eliminate the cause of nonconformities. Information obtained is incorporated into design rule documentation, design and process FMEAs, and process control plans. Corrective actions are applied to other similar processes and products to eliminate the cause of a nonconformity in accordance with Spansion Operations Functions and Key Processes <F01-001.1>.

8.5.2.4 Rejected Product Test/Analysis (ISO/TS 16949)

Product rejected by the customer is analyzed in accordance with Customer Corrective Action Request (CCAR) System <F01-022> and Customer Corrective Action Request (CCAR) and FA Support Policy <608-QR023>.

8.5.3 Preventive Action

Spancion has established multiple processes within the product realization process for the prevention of potential nonconformities. Preventive Action System <F01-028> and Corrective and Preventive Action <608-QR007> describe the responsibilities and the various methods used to eliminate future product and processes issues. Department management and employees address potential nonconformities and take the necessary actions to prevent occurrences. It is the department manager's responsibility to establish methods to encourage employees to use preventive measures and to track the actions taken. The managers have methods for measuring the effectiveness of these actions. A review of the actions is an item on the agenda for management review meetings. Records of the results of actions taken are maintained in accordance with Records Management Policy <F00-014>.

APPENDIX A - Referenced Specifications/Documents

Referenced Specifications/Documents by Quality Manual Sections

4.0 Quality Management System

F00-001	Spansion Quality Manual
F00-007	Corporate Audit and Assessment Policy
F00-014	Records Management Policy
F00-046	Foundry and Joint Venture Quality Policy
F00-098	Document Management Policy
F01-002.1	Design Development and Qualification Procedure
F01-006	Process Flow System
F01-008	Specification System
F01-018	Decision Record System
F01-020	Corrective Action System
F01-028	Preventive Action System
F01-036	Records Management System
F01-401	External Spec/Standard Control
F03-070	Quality Requirements for Spansion Final Manufacturing Subcontractors
F08-072	General Customer Specification Review Standard Operating Procedure
F08-074	Customer Drawing Review Standard Operating Procedure
F08-2001	Controlled Specification and Distribution Process
608-QR007	Corrective and Preventive Action
608-QR018	Internal Audits

5.0 Management Responsibility

F00-014	Records Management Policy
F01-001.1	Spansion Operations Functions and Key Processes
F01-018	Decision Record System
F01-022	Customer Corrective Action Request (CCAR) System
F01-224	Customer Satisfaction Measurement
307-0002	Fab 25 Management Review
F07-038	Electrical Reject Notice
F08-023	FMO Management Review Procedure
608-QR006	Management Responsibility
608-QR023	Customer Corrective Action Request (CCAR) and FA Support Procedure
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6.0 Resource Management

F00-011	Competence, Training, and Awareness Policy
F00-014	Records Management Policy
F00-016	Handling Procedure for Prevention of ESD Damages
F01-002.1	Design Development and Qualification Procedure
F01-002.4	Product Engineering Development, Qualification and Change Management Process
F01-123	Sort/Wet Area Requirements
F01-124	Wafer Fabrication Area Requirements
F01-125	Test Area Requirements
F01-126	Burn-In Area Requirements
F01-127	Assembly Area Requirements
F01-128	Mark and Pack Requirements
F01-210	Corp. Manufacturing Training System
F01-525	Spansion Sunnyvale – Facilities Contingency Plan
04-XXXXXXX	Material Specifications
05-XXX	Process Specifications
307-8466	Fab 25 Contingency Plan for Business Recovery
07-XXX	Work Instructions
808-012	Spansion Penang Relayout
708-106	Layout Planning and Execution
F08-121	FMO-Contingency Planning for Business Recovery
16-019	Gas Line Filtration
F16-022	Atmosphere Quality Levels
F16-023	DI Water/UPW Limits
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7.0 Product Realization

F00-002	Product Management Policy
F00-003	Product Planning Policy
F00-004	Standard Processing Specification
F00-005	Product Quality Levels
F00-014	Records Management Policy
F00-015	Calibration Policy
F00-016	Handling Procedure for Prevention of ESD Damages
F00-023	Change Notification Policy
F00-033	Wafer Handling and Storage Outside Fab
F00-037	Supplier Quality Policy
F00-038	Spansion Product Traceability Policy

F00-097	Product Obsolescence Policy
F00-1000	Corporate Purchasing Policy – Purchasing Authority
F01-001.1	Spancion Operations Functions and Key Processes
F01-001.2	Production Part Approval Process
F01-002.1	Design Development and Qualification Procedure
F01-002.2	Technology Development, Qualification, and Change Management Process
F01-002.3	Final Manufacturing Operations Development and Qualification Procedure and Change Management Process
F01-002.4	Product Engineering Development, Qualification and Change Management Process
F01-002.6	Product Planning Procedure
F01-002.15	Spancion Qualification Guidelines
F01-006	Process Flow System
F01-008	Specification System
F01-009	Procedure for Auditing Service Suppliers
F01-018	Decision Record System
F01-022	Customer Corrective Action Request (CCAR) System
F01-025.6	Measurement Systems Analysis (MSA)
F01-040	FMO Manufacturing Planning Process and System
F01-045	Contract Review Process & Support Responsibility for Field Sales and Global Customer Service
F01-045.1	TS 16949 Contract and Drawing Review Process for Field Sales
F01-080	Spancion Lot Numbering System
F01-092	Procurement System
F01-122	Assy & TMP Tooling Management System
F01-12X	Minimum Area Requirements Specifications
F01-142	Inventory Storage Requirements
F01-179	Fab Planning/Scheduling System
F01-210	Corp. Manufacturing Training System
F01-226	MGM/MSD Preventive & Predictive Maintenance System
02-001	Assembly Process Flow Charts and Control Plan
F02-028	Spancion TMP Process Flow and Control Plan
F03-001	Approved Suppliers – Materials
03-001.X	Approved Supplier Lists
F03-005	Incoming Material Control
F03-070	Quality Requirements for Spancion Final Manufacturing Subcontractors
F03-146	Quality Management System Requirements for Foundries
05-XXX	Process Specifications
F06-001	Physical Distribution Quality Inspection Requirements
F06-027	Final In-line Quality Inspection
06-XXX	Inspection Instructions
07-064	Boxstock Sales Order Preparation
07-119	Matl Ship & Intercompany Rec.

307-8464	Fab 25 Measurement Systems Analysis (MSA)
07-XXX	Work Instructions
F08-023	FMO Management Review Procedure
608-QR006	Management Responsibility
608-QR023	Customer Corrective Action Request (CCAR) and FA Support Procedure
608-OP031	Control of Monitoring and Measuring Devices
X13-010	Local Calibration Recall Specifications
F16-006	Spansion Date Code System
F16-017	Packaging and Orientation Standard for Spansion
F16-022	Atmosphere Quality Levels
F16-023	DI Water/UPW Limits
F16-050	Shipping Labeling Requirement
F16-054	Container Label Requirement
16-201	Wafer Pack and Ship Standard
F16-203	Materials Restricted from Product Design-Internal
Overview 2A	Business Planning Overview

8.0 Measurement, Analysis and Improvement

F00-004	Standard Processing Specification
F00-007	Corporate Audit and Assessment Policy
F00-010	Corporate Returns Policy
F00-014	Records Management Policy
F00-043	Customer Requests for F/A and CAR
F00-066	Statistical Process Management
F01-001.1	Spansion Operations Functions and Key Processes
F01-001.2	Production Part Approval Process
F01-002.2	Technology Development, Qualification, and Change Management Process
F01-002.18	QMP Procedure
F01-008	Specification System
F01-018	Decision Record System
F01-019	Worldwide Quality Systems Audit
F01-019.4	WQSA Training
F01-020	Corrective Action System
F01-022	Customer Corrective Action Request (CCAR) System
F01-022.2	TS 16949 Non-Standard CCAR TAT
F01-025	Assembly & End of Line Quality Methodology
F01-028	Preventive Action System
F01-045	Contract Review Process & Support Responsibility for Field Sales and Global Customer Service
F01-124	Wafer Fabrication Area Requirements
F01-131	Material Review Board – Incoming Materials
F01-156	Customer Advisory System

F01-224	Customer Satisfaction Measurement
02-001	Assembly Process Flow Charts and Control Plan
F02-028	Spansion TMP Process Flow and Control Plan
02-XXX	Process Flow Charts
F03-072	Physical Distribution and Global Logistics Supplier Evaluation Process
05-XXX	Process Specifications
06-XXX	Inspection Instructions
F07-098	Worldwide Returns Processing Procedure
07-XXX	Work Instructions
F08-2001	Controlled Specification and Distribution Process
608-QR007	Corrective and Preventive Action
608-QR018	Internal Audits
608-QR023	Customer Corrective Action Request (CCAR) and FA Support Procedure

APPENDIX B - Definitions

Quality Management System Definitions

If additional information is needed, refer to ISO 9000:2005.

APQP:	Advanced Product Quality Planning
APT:	Advanced Package Technology
Audit:	Systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled
Audit Client:	Organization or person requesting an audit
Audit Conclusion:	Outcome of an audit provided by the audit team after consideration of the audit objectives and all audit findings
Audit Criteria:	Set of policies, procedures or requirements
Audit Evidence:	Records, statements of fact or other information, which are relevant to the audit criteria and verifiable
Audit Findings:	Results of the evaluation of the collected audit evidence against audit criteria
Audit Programme:	Set of one or more audits planned for a specific time frame and directed towards a specific purpose
Audit Team:	One or more auditors conducting an audit, supported if needed by technical experts
Auditee:	Organization being audited
Auditor:	Person with the demonstrated personal attributes and competence to conduct an audit
CAD:	Computer Aided Design
CAE:	Computer Aided Engineering

Camstar:	FMO Manufacturing Execution System (MES)
Capability:	Ability of an organization, system or process to realize a product that will fulfill the requirements for that product
CAR:	Corrective Action Request
CCAR:	Customer Corrective Action Request
Characteristic:	Distinguishing feature (Example: Physical, Sensory, Behavioral, Temporal, Ergonomic and Functional)
Competence:	Demonstrated ability to apply knowledge and skills
Concession:	Permission to use or release a product that does not conform to specified requirements
Conformity:	Fulfillment of a requirement
Continual Improvement:	Recurring activity to increase the ability to fulfill requirements
Contract:	Binding agreement
Control Plan:	Documented description of the systems and processes required for controlling product
Correction:	Action to eliminate a detected nonconformity
Corrective Action:	Action taken to eliminate the cause of a detected nonconformity or other undesirable situation in order to prevent recurrence
Customer:	Organization or person that receives a product
Customer Satisfaction:	Customer's perception of the degree to which the customer's requirements have been fulfilled Note: The term customer satisfaction embodies the concept of partnering with customers in an ongoing pursuit to exceed their expectations.
Data:	A record (or recorded information) resulting from a

document

Defect:	Non-fulfillment of a requirement related to an intended or specified use
Dependability:	Collective term used to describe the availability performance and its influencing factors; reliability performance, maintainability performance and maintenance support performance
Design and Development:	Set of processes that transforms requirements into specified characteristics or into the specification of a product, process or system
Design Responsible Organization:	Organization with the authority to establish a new, or change an existing, product specification
Design Review:	Documented, comprehensive, and systematic examination of a design to evaluate its capability to fulfill the requirements for quality, identify problems, if any, and propose the development of solutions
Deviation Permit:	Permission to depart from the originally specified requirements of a product prior to realization
DFA:	Design for Assembly
DFM:	Design for Manufacturing
DFMEA:	Design Failure Mode and Effects Analysis
DFT:	Design for Testability
DNA:	Definitive Nomenclature Application
Document:	Information and its supporting medium, e.g., policies, internal/external specifications and standards, procedures, instructions, records
EDI:	Electronic Data Interchange
Effectiveness:	Extent to which planned activities are realized and planned results achieved

Efficiency:	Relationship between the result achieved and the resources used
Error-Proofing:	Product and manufacturing process design and development to prevent manufacture of nonconforming products
ESD:	Electro Static Discharge
EVA:	Economic Value Added
5S:	A lean manufacturing concept and methodology that focuses upon simplifying the work environment, reducing waste, and improving quality and safety (5S: Sort, Straighten, Shine, Standardize, and Sustain)
FMEA:	Failure Mode and Effects Analysis
FMO	Final Manufacturing Operations
Grade:	Category or rank given to different quality requirements for products, processes or systems having the same functional use
GSM:	Global Supply Management
Information:	Meaningful data
Infrastructure:	System of facilities, equipment and services needed for the operation of an organization
Inspection:	Conformity evaluation by observation and judgment accompanied as appropriate by measurement, testing or gauging
Interested Party:	Person or group having an interest in the performance or success of an organization
Laboratory:	Facility for inspection, test or calibration that may include, but is not limited to chemical, metallurgical, dimensional, physical, electrical or reliability testing

Note: Definition from “Customer Specific Requirements (ISO/TS-16949) Semiconductor Commodity”

For laboratory scope, laboratories are those facilities that perform reliability, qualification or durability testing to the requirements of a customer documented specification

Laboratory Scope:	Controlled document containing <ul style="list-style-type: none">• specific tests, evaluations and calibrations that a laboratory is qualified to perform,• list of the equipment which it uses to perform the above, and• list of methods and standards to which it performs the above
Layout Inspection:	The complete measurement of all part dimensions shown on the design record
Management:	Coordinated activities to direct and control an organization
Management Review:	Formal evaluation by top management of the status and adequacy of the quality management system in relation to the quality policy and objectives
Management System:	System to establish policy and objectives and to achieve those objectives
Manufacturing:	Process of making or fabricating <ul style="list-style-type: none">• production materials,• production or service parts,• assemblies, or• heat treating, welding, painting, plating or other finishing services
Measurement Management System:	Set of interrelated and interacting elements necessary to achieve metrological confirmation and continual control of measurement processes
Measurement Process:	Set of operations to determine the value of a quantity
Measuring Equipment:	Measuring instrument, software, measurement standard, reference material or auxiliary apparatus or combination thereof necessary to realize a measurement process

Metrological Characteristic:	Distinguishing feature which can influence the results of measurement
Metrological Confirmation:	Set of operations required to ensure that measuring equipment conforms to the requirements for its intended use
Metrological Function:	Function with administrative and technical responsibility for defining and implementing the measurement management system
MSA:	Measurement Systems Analysis
Nonconformity:	Nonfulfillment of a requirement
NVT:	Non-Volatile Technology
Objective Evidence:	Data supporting the existence or verity of something
OHSAS:	Occupational Health and Safety Assessment Series
Organization:	Group of people and facilities with an arrangement of responsibilities, authorities and relationships, e.g., company, corporation, firm, enterprise
Organizational Structure:	Arrangement of responsibilities, authorities and relationships between people
Performance Indicators:	Metrics that provide decision-making information on the effectiveness, the condition, or the direction of a process
PFMEA:	Process Failure Mode Effects Analysis
PLC:	Product Life Cycle
PLC/UMS:	Spansion's single global system for developing new products, technologies, and businesses
PPAP:	Production Part Approval Process
PPCD Team:	Proposed Process Change Document Team
Predictive Maintenance:	Activities based on process data aimed at the avoidance of maintenance problems by prediction of likely failure modes

Premium Freight:	Extra costs or charges incurred additional to contracted delivery
Preventive Action:	Action to eliminate the cause of a potential nonconformity or other undesirable potential situation in order to prevent occurrence
Preventive Maintenance:	Planned action to eliminate causes of equipment failure and unscheduled interruptions to production, as an output of the manufacturing process design
Procedure:	Specified way to carry out an activity or a process
Process:	Set of interrelated or interacting activities which transforms inputs into outputs
Product:	Result of a process
Project:	Unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements including the constraints of time, cost and resources
QMS:	Quality Management System
Qualification Process:	Process to demonstrate the ability to fulfill specified requirements
Quality:	Degree to which a set of inherent characteristics fulfills requirements
Quality Assurance:	Part of quality management focused on providing confidence that quality requirements will be fulfilled
Quality Characteristic:	Inherent characteristic of a product, process or system related to a requirement
Quality Control:	Part of quality management focused on fulfilling quality requirements
Quality Improvement:	Part of quality management focused on increasing the ability to fulfill quality requirements

Quality Management System:	Management system to direct and control an organization with regard to quality
Quality Objective:	Something sought or aimed for, related to quality
Quality Plan:	Document specifying which procedures and associated resources shall be applied by whom and when to a specific project, product, process or contract
Quality Planning:	Part of quality management focused on setting quality objectives and specifying necessary operational processes and related resources to fulfill the quality objectives
Quality Policy:	Overall intentions and direction of an organization related to quality as formally expressed by top management
Quality System:	The organizational structure, procedures, processes and resources needed to implement quality management
Record:	Document stating results achieved or providing evidence of activities performed
Regrade:	Alteration of the grade of a nonconforming product in order to make it conform to requirements differing from the initial ones
Release:	Permission to proceed to the next stage of the process
Reliability:	The condition of maintaining product quality over a specified time
Remote Location:	Location that supports sites and at which non-production processes occur
Repair:	Action on a nonconforming product to make it acceptable for the intended use
Requirement:	Need or expectation that is stated, generally implied or obligatory
Review:	Activity undertaken to determine the suitability, adequacy, and effectiveness of the subject matter to achieve established objectives

Rework:	Action on a nonconforming product to make it conform to the requirements
Scrap:	Action on a nonconforming product to preclude its originally intended use
Site:	Location at which value-added manufacturing processes occur
Spansion ®	A registered trademark of Spansion LLC in the US and other countries
SPC:	Statistical Process Control
Special Characteristics:	Product characteristic or manufacturing process parameter which can affect safety or compliance with regulations, fit, function, performance or subsequent processing of product Critical parameters defined by Spansion and documented in the control plan or characteristics defined by the customer and documented in DNA via the PF (Processing Flow)
Specification:	Document stating requirements
Subcontractor:	Organization that provides a product to the supplier
Supplier:	Organization or person that provides a product
System:	Set of interrelated or interacting elements
Technical Expert:	Person who provides specific knowledge or expertise to the audit team
Test:	Determination of one or more characteristics according to a procedure
TMP:	Test, Mark and Pack
Top Management:	Person or group of people who directs and controls an organization at the highest level
Traceability:	Ability to trace the history, application or location of that which is under consideration

When considering product, traceability can relate to

- origin of material
- process history
- distribution and location of product after delivery

UMS:

Unified Milestone System

Validation:

Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled

Verification:

Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

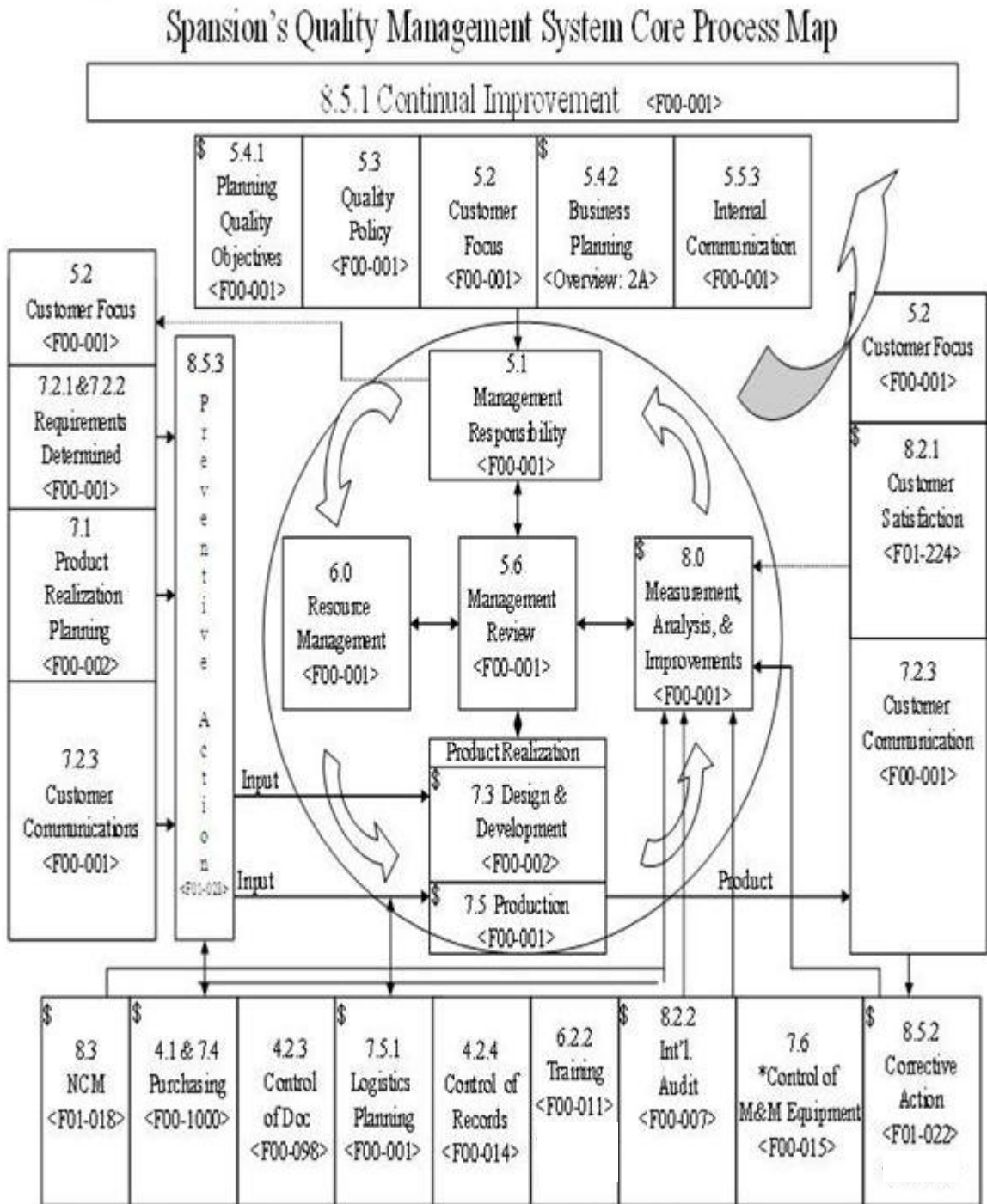
Work Environment:

Set of conditions under which work is performed

WQSA:

Worldwide Quality Systems Audit

APPENDIX C – Spansion’s Quality Management System Core Process Map



*Note: M&M = Monitoring and Measurement

Note: \$ = Key Performance Indicators