



QUALITY MANUAL

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Revision B See ➤ 7 for Revision History.

Revised by Shawn Hudson, 03/14/2013.

~ **1 Purpose and Scope** Updated the corporate mission and added statement about support of the automotive market

~ **2 Triad Profile** Added statement that Triad designs and develops EDA software to aid in ASIC design

~ **3.3** Added reference to ISO/TS16949 (automotive)

~ **4.3** Added definition of EDA Software

~ **Figure 1** Revised to include software design and development in the product realization process

~ **6.5.2** Added statement that personnel with responsibility for quality have the authority to stop product realization processes

~ **6.6.2.H** Added review of actual and potential field failures for automotive products

~ **7.1.1 – 7.1.2** Added statements around demand generation through EDA software

~ **8.1** Revised to include EDA Software design and development in the product realization process

~ **8.1.3.A** Added statements for automotive product realization (design), including multi-disciplinary approach and use of AIAG core tools

~ **10** Added text in opening paragraph to clarify the approach to continual improvement at Triad

~ **Figure 2** Added to show key continual improvement inputs, improvement tools and outputs

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1 PURPOSE AND SCOPE

This manual describes the Triad Semiconductor, Inc. (Triad) Quality Management System (QMS) used to achieve the corporate mission:

Changing the World of Analog and Mixed Signal Design and Implementation

The Quality Management System is based on the consistent customer-supplier relationship and establishes the model for managing the activities that design, develop and deliver quality products to satisfy Triad's customers.

The QMS applies to Triad's business processes and upholds the **ISO 9001:2008**.

Triad supports the automotive market by meeting ISO/TS16949 requirements applicable to product design and delivery, and by selecting and working with a supply chain with appropriate certifications. Activities specific to automotive products and processes are differentiated in **bold blue text**.

2 TRIAD PROFILE

Triad Semiconductor was founded in August 2002 with headquarters in Winston-Salem, North Carolina. Triad is a privately held fabless semiconductor company that designs, develops, prototypes and produces mixed-signal ASICs (Application-specific integrated circuits). Triad offers customers flexibility to do preliminary design of the ASIC through EDA software developed and sold by Triad. All manufacturing and testing is subcontracted.

3 APPLICABLE DOCUMENTS

3.1 **ISO-9000** Quality management systems . Fundamentals and vocabulary

3.2 **ISO-9001** Quality management systems . Requirements

3.3 **ISO/TS 16949** **Quality management systems – Particular requirements for the application of ISO9001:2008 for automotive production and relevant service part organizations**

4 DEFINITIONS / ACRONYMS

4.1 The terms and Definitions defined in **ISO 9000** apply.

4.2 **ASIC** (Application-Specific Integrated Circuit) an integrated circuit customized for a particular use.

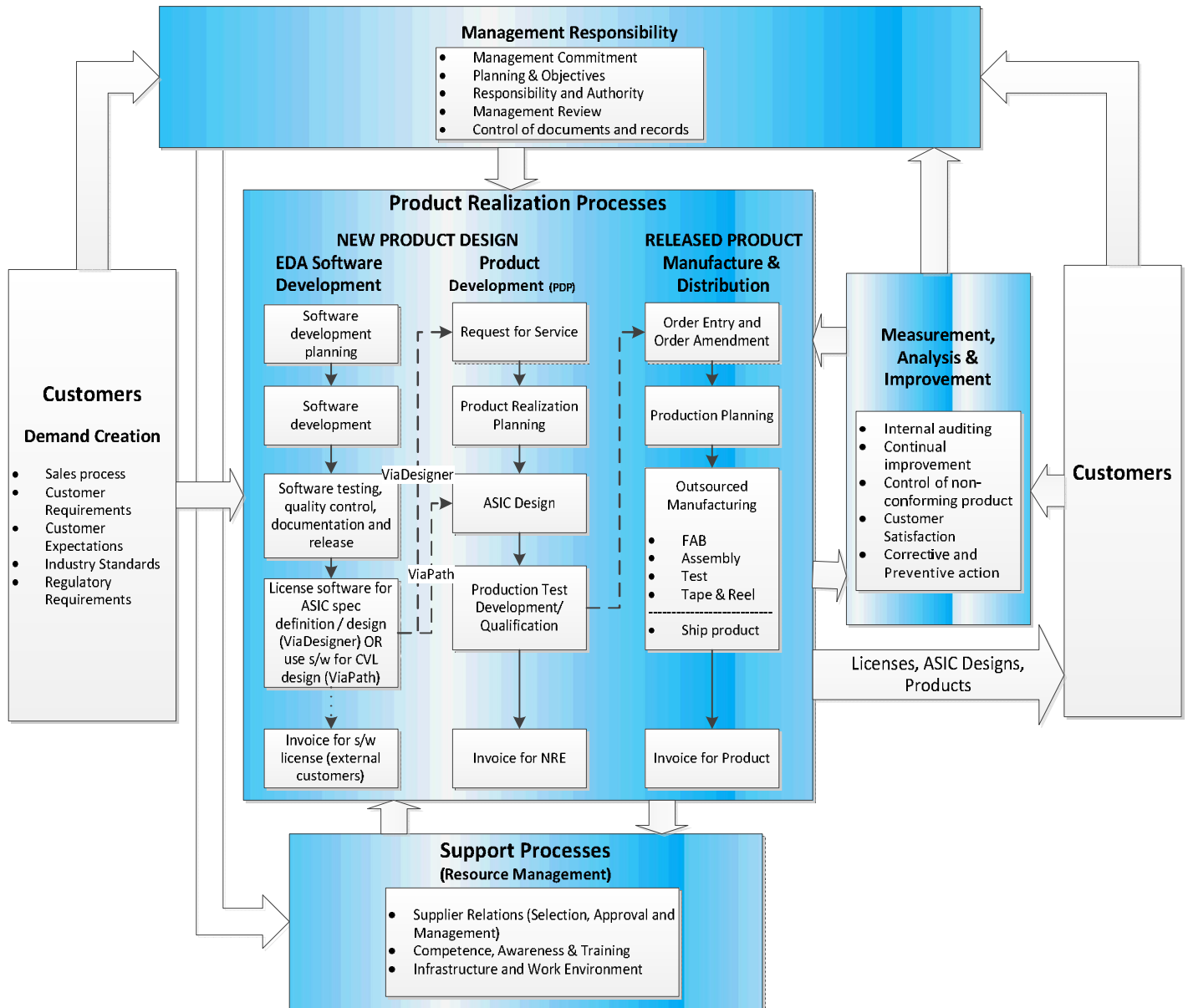
4.3 **EDA (Electronic Design Automation)** computer software used to design and develop mixed signal ASICs.

5 QUALITY MANAGEMENT SYSTEM PROCESS

5.1 The Quality Management System is defined by the process map shown in [Figure 1](#).

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Figure 1. Triad Semiconductor Quality Management System



6 MANAGEMENT PROCESSES

- 6.1 The commitment of top management at Triad is demonstrated in the development and implementation of the quality management system and the continual improvement of its effectiveness. This is accomplished by:
- 6.1.1 Communicating the importance of meeting customer, statutory and regulatory requirements
 - 6.1.2 Establishing the quality policy
 - 6.1.3 Ensuring that quality objectives are established
 - 6.1.4 Conducting management reviews
 - 6.1.5 Ensuring the availability of resources
- 6.2 The quality policy is established by top management and is included in management reviews to ensure it is appropriate and suitable for Triad, that it includes a commitment to meeting all requirements and continually improving the effectiveness of the QMS, and provides a framework for establishing and reviewing the quality objectives. The quality policy is communicated and understood within the organization. Triad's quality policy is below.

Triad Semiconductor is committed to:

- “ Meeting the needs of our customers in the design, manufacture and supply of reliable and innovative ASIC technologies and products**
- “ Achieving customer satisfaction through continual improvement of our processes, products and services**
- “ Providing “best in class” product quality & customer service**
- “ Providing a challenging and rewarding environment for our employees**

- 6.3 The business planning process at Triad involves a variety of information delivered through multiple channels. Business reviews include assessment of past performance, current activities and future opportunities. The business plan is updated on an annual basis and is approved by the Board of Directors. The planning process drives projects and allocation and appropriation of resources.
- 6.4 Quality objectives are derived to align with the business plan and the quality policy. Quality objectives are translated into departmental and individual goals. Progress toward goals is reviewed on a quarterly basis, with adjustments made to meet changing business needs.
- 6.5 Responsibility and Authority
- 6.5.1 The management of each department defines and documents the responsibilities and authorities within their department to manage, perform and verify activities that impact the quality management system. Procedures and work instructions are one method used to document these responsibilities.
 - 6.5.2 Personnel responsible for conformity to product requirements have the authority to stop product realization (design and/or production) to correct quality problems.

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6.5.3 The Quality Manager has responsibility and authority that includes ensuring processes need for the QMS are established, implemented and maintained; reporting to management on the performance of the QMS and any need for improvement; and ensuring the promotion of awareness of customer requirements throughout the organization.

6.6 Management Review

6.6.1 The QMS is reviewed by top management once a year, at a minimum, to ensure its continuing suitability, adequacy and effectiveness. The reviews identify improvement opportunities, identify needed changes to the QMS, quality policy and/or quality objectives.

6.6.2 Inputs to the review include:

- A Results of audits
- B Customer feedback / customer satisfaction
- C Process performance and product conformity
- D Status of corrective and preventive actions
- E Follow-up actions from previous management reviews
- F Other items or measures critical to the business
- G Changes that could affect the QMS
- H **Analysis of actual and potential field failures for automotive products, and their impact on quality, safety or the environment**
- I Recommendations for improvement

6.6.3 Outputs from the review include any decisions and actions related to:

- A Improvement of the effectiveness of the QMS and its processes
- B Improvement of product related to customer requirements
- C Resource needs

6.6.4 Records from the management review are maintained by Quality.

6.7 Documents and records required by the QMS are controlled as defined in **PRO-0001, Control of Documents and Records.**

7 **DEMAND CREATION**

7.1 Marketing and Applications work to identify new or potential customers, as well as with existing customers to identify opportunities for new product designs that fit Triad's capabilities and core competencies. Customer requirements and expectations are communicated with appropriate departments within Triad to assess the fit for new business, and to ensure resource availability.

7.1.1 Triad designs and develops software to enable customers to own part of the ASIC design effort, thereby reducing development time at Triad. Customers may purchase a license for the software to aid in the design, allowing more definition of the ASIC spec when the design proposal is submitted.

7.1.2 Alternatively, Triad maintains the capability and resources to do full ASIC design and development after working with customers to determine product requirements.

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- 7.2 Industry standards and regulatory requirements are identified as inputs to new business, and are considered when identifying new opportunities. Regulatory requirements are included in new design proposals and incorporated in the design and development requirements.
- 7.3 After the design and development processes are completed, the Marketing and Technical Sales team continue to work with customers to identify demand opportunities for released products. Quality, Operations and Sales monitor customer perceptions and take action to increase satisfaction in order to capture any of these opportunities.

8 PRODUCT REALIZATION PROCESSES

- 8.1 Product realization processes at Triad include development of EDA software, new (ASIC) product design and development and manufacture of released products.
 - 8.1.1 **Order Entry, Amendment and Acknowledgement, PRO-0008**, defines the process for receipt of customer orders, planning for execution against the order, and methods for amending and acknowledging the order. Customer requirements are reviewed at this point to verify that Triad can commit to filling the order.
 - 8.1.2 The Product realization process for software development is described in **PRO-0009, ViaPath Development Process** and **PRO-0012, ViaDesigner Development Process**. Triad works closely with customers, partners and industry experts to understand market opportunities for EDA software to aid in ASIC spec development and ASIC design. Anticipated needs and requirements are converted to software features through the development process. The software development process addresses:
 - A Design and development planning to ensure that resources are appropriately assigned and responsibilities and authorities are clearly defined to allow software capabilities to be met.
 - B Design and development inputs are determined and clearly communicated to the design team.
 - C Design and development outputs are captured in a form suitable for verification against the development inputs, and are approved through testing prior to release. Outputs include documentation and support required to effectively utilize the software.
 - D Design and development reviews necessary to ensure that requirements are met and to identify problems and needed actions to perform design according to plan.
 - E Design and development verification prior to release and validation through customer feedback.
 - F Control of design and development changes through software revision control.
 - 8.1.3 The Product realization process for new ASIC product development is described in **PRO-0005, Product Development Process (PDP)**. Triad works closely with customers in understanding requirements for ASICs, and in verifying and validating that requirements have been met. The product development process addresses:
 - A Design and development planning to ensure that resources are appropriately assigned and responsibilities and authorities are clearly defined to allow customer requirements to be met through the design process.

8.1.3.A.1 A multidisciplinary approach to preparing for product realization is used in the design of automotive products, and is defined in appropriate procedures, work instructions and forms.

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8.1.3.A.2 AIAG core tools are used as appropriate to comply with automotive customer requirements in achieving error-proofing and prevention of nonconformities.

- B Design and development inputs are determined and clearly communicated to the software development team. Inputs are verified to include customer requirements as well as statutory, regulatory and other requirements.
- C Design and development outputs are captured in a form suitable for verification against the design and development inputs, and are approved prior to release. Outputs include provisions for purchasing and production after product release, and contain product acceptance criteria, and specify characteristics essential to the safe and proper use of the product.
- D Design and development reviews necessary to ensure that requirements are met and to identify problems and needed actions to perform design according to plan.
- E Design and development verification and validation prior to release, including control of monitoring and measuring equipment necessary to provide evidence of conformity of product to requirements.
- F Control of design and development changes.

8.1.4 The product realization process for released products is described in **PRO-0010, Order Execution for Released Products**. This procedure includes provisions for:

- A The purchasing process, including supplier selection and evaluation, to ensure that purchased product conforms to requirements.
- B Verification of purchased product to ensure specified purchase requirements are met.
- C Control of production and services under controlled conditions.
- D Identification and traceability of product.
- E Preservation of product to ensure safe and proper use.
- F Where applicable, control of monitoring and measuring equipment necessary to provide evidence of conformity of product to requirements.

9 RESOURCE MANAGEMENT

Triad provides the resources needed to implement and maintain systems to ensure that customer requirements are met and the quality management system is maintained and continually improved.

9.1 Each department establishes competency needs for personnel performing activities affecting the quality management system and product and design compliance. Appropriate records of training, education, skills and experience are maintained and retained.

9.2 **PRO-0006, Supplier Selection, Approval, and Management** defines the steps involved in supplier relations that directly or indirectly impact the ability of Triad Semiconductor to meet customer requirements.

9.2.1 **Suppliers of production services for automotive products must be certified to ISO9001:2008 and/or ISO/TS16949 by an accredited third-party certification body, with ISO/TS16949 certification preferred. Each automotive manufacturing process is audited to verify its effectiveness and compliance to customer requirements.**

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9.2.2 **Contingency plans to satisfy customer requirements in the event of emergencies are required from subcontractors providing services for automotive products.**

9.3 Infrastructure and work environment are provided and maintained as needed to allow the effective design and development of custom ASICs to meet customer needs, and to support the outsourced manufacture and supply of products to our customers.

10 MEASUREMENT, ANALYSIS AND IMPROVEMENT

Triad ensures conformity of the quality management system and demonstrates conformance to customer requirements through measurement and analysis of processes. The outputs of measurement and analysis are used to drive improvement of products, processes and services. Continual improvement is achieved through the use of the quality policy, quality objectives (see 6.4), audit results, analysis of data, corrective and preventive actions and management review. Continual improvement is everyone's responsibility, and is achieved through tools and techniques appropriate to the opportunity (see [Figure 2](#)).

10.1 Triad maintains an active Internal Audit program, with audits conducted in accordance with the process and requirements defined in **PRO-0002, Internal Audit Program**. Findings and opportunities for improvement from internal are a key source of inputs to the continual improvement efforts.

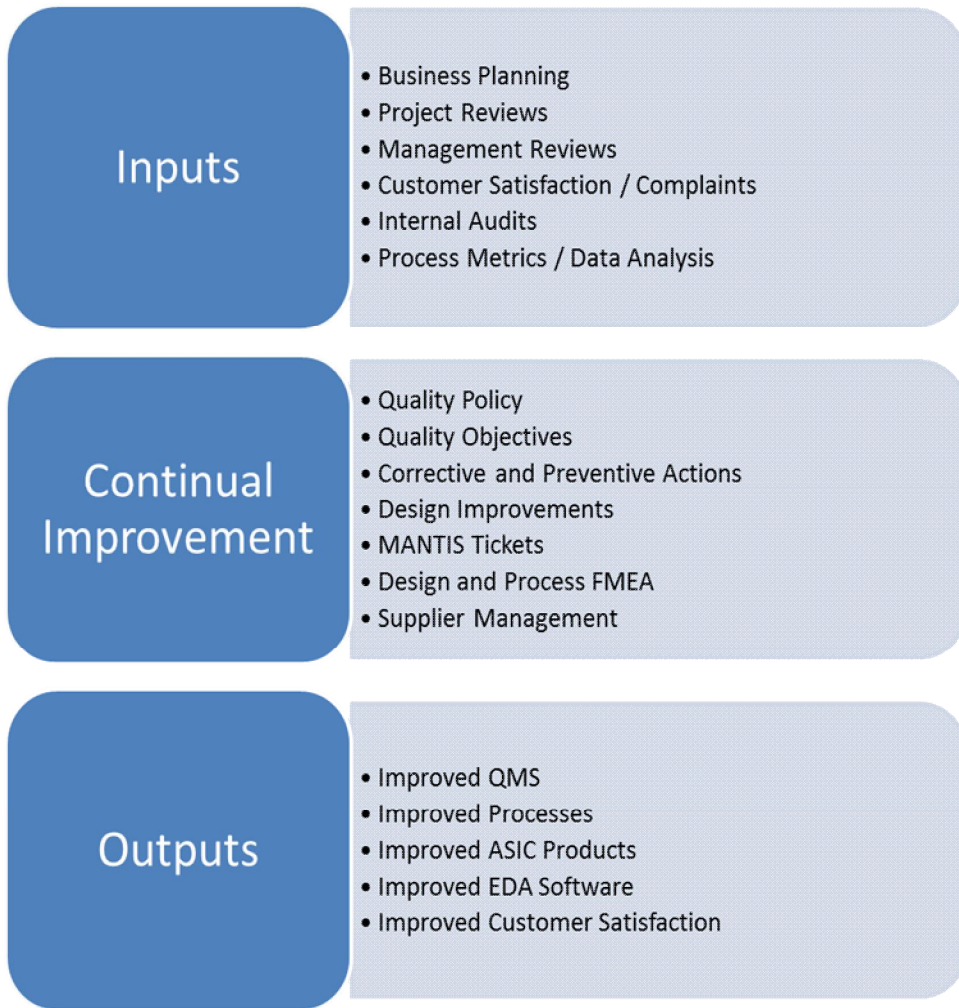
10.2 **PRO-0003, Control of Non-conforming Material**, establishes the process for identifying, controlling and preventing the unintended use of product and materials which do not conform to requirements.

10.3 Triad monitors customer perception of Triad products and services including the use of Triad-developed EDA software, ASIC product design, and manufacturing phases of product realization, using inputs appropriate to the stage of the customer relationship. Customer perception is reviewed regularly, and actions are taken to continually improve customer perception. **PRO-0007, Customer Satisfaction**, outlines the methods used for monitoring and reporting.

10.4 Triad is committed to continual improvement by identifying and removing potential and actual nonconformities in our processes and products. The process used is defined in **PRO-0004, Corrective and Preventive Action**.

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Figure 2. Triad Semiconductor Continual Improvement Process



Revision history

Rev.	Description
-	Initiated by Shawn Hudson, 01/23/2012. " Initial Release
A	Revised by Shawn Hudson, 03/22/2012. Figure 1 Updated to match process matrix to have consistency across all documents