



# **Quality Assurance Manual**

**DOC ID # 10-0137**

**NEW REV: P**

## Introduction

One of the cornerstones of Maxim's success was and is to deliver the highest quality product technically possible to our customers.

On the following page you will find Maxim's quality policy. This is Maxim's commitment to our customers to continuously improve our products and services. We believe you have rewarded Maxim for this commitment by purchasing our products. We thank you for this acknowledgment of an ethical and economic principle we both believe in.

Maxim operates a comprehensive quality management system, conducts extensive reliability qualification and monitoring of our products, and provides global customer quality and failure analysis support which we believe is unmatched in our industry.


This manual describes our quality management system, and is meant to be a general guide through the many areas of our program. Each section summarizes the more important aspects of each facet of our quality management system while providing a list of the more detailed specifications that apply.

At Maxim we continue to strive for perfection. We encourage your feedback on our performance and areas of improvement.



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Tunc Doluca  
Chief Executive Officer (CEO)

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# Quality Policy


The quality policy for Maxim is pragmatic. It reflects on our philosophy that quality is more than a noble issue. The quality concept at Maxim flourishes because of the significant sales and manufacturing benefits it provides. These can be summarized as follows:

## 1. Customers Require Quality

- A. If Maxim doesn't produce the highest quality products, customers will seek other companies who do.
- B. Customers define a product's quality. Maxim listens to customer inputs on how to improve what we do. Customer inputs ultimately define what they expect to buy.


## 2. Quality Improves Profitability

- A. The highest possible yields define the lowest possible manufacturing costs.
- B. High and improving yields are a direct result of attaining high and improving quality.
- C. High quality is attained by paying attention to details. Where a quality problem exists, find the root cause and fix it.
- D. Don't accept our current quality as the status quo. Quality improvements must continuously occur to keep pace with market demands for lower costs, which can only be achieved through attaining high yields.
- E. Our objective is to design in quality rather than to improve it through testing.

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## 1.0 Applicable Documents

The following documents comprise a part or form the basis of this Quality Assurance Manual:

AEC-Q-100	Stress test Qualification for Integrated Circuits
ANSI Z540	Calibration Practices
ISO 9001	Quality management Systems – Requirements
ISO 14001	Environmental Management System
ISO/IEC17025	General requirements for the competence of testing and calibration laboratories
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant reference manuals.
JEDEC/EIA-xxxx	General Commercial Quality Practices
MIL-I-45208	Inspection System Requirements
Mil-M-38510	General Specifications for Microcircuits
MIL-PRF-19500	General Specifications for semiconductor devices
Mil-PRF-38535	General Specifications for Integrated Circuits Manufacturing
MIL-Q-9858	Quality Program Requirements
MIL-STD-883	Test Methods and Procedures for Microcircuits
Mil-STD-45662	Calibration System Requirements

**NOTE:** References to key quality system procedures are found at the end of each section of this manual.

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## 2.0 Product Assurance Program

### Policy

A Product Assurance Program shall be maintained for the purpose of assuring the standards of quality are upheld, throughout all manufacturing stages including design, manufacture and delivery. The responsibility of this program is not assigned to any one department but is a shared responsibility of every employee at Maxim. It is their responsibility to be aware and comply with the respective sections of the Product Assurance Program that apply to their areas.

### Description

1. The Product Assurance Program is developed, administered and maintained by the Quality Assurance and Reliability Department, with the assistance of other organizations intertwined within the fabric of this program. Personnel working within this department have been given sufficient responsibility, authority and organizational freedom to identify, contain, evaluate, recommend and initiate corrective actions to quality problems. This license is granted and empowered by the authority of the company Chief Executive Officer (CEO)
2. The Product Assurance Program is structured to comply with the applicable portions of the specifications listed in Section 1.0.
3. Major and significant changes to this Product Assurance Program require the approval of the CEO—and applicable members of his staff.
4. The Product Assurance Program recognizes 3 levels of product with respect to assurance requirements.
  - A. **Commercial Class:** These products are held to and comply with the basic commercial practice quality requirements, such as JEDEC/EIA standards. They are also held to MTTF and Failure In Time (FIT) limits, process screening requirements and qualification as specified in Maxim's current data book or equivalent and published in the Maxim website.
  - B. **Military Class:** These products are held to and comply with the quality requirements defined in MIL-STD-883, Class B.
  - C. **Automotive Class:** These products are held to and comply with the quality requirements defined in ISO/TS16949 and related reference manuals
5. Annual reviews of the Product Assurance Program will be held with Executive Management responsible for product quality. Records of such meetings/reviews will be maintained by Quality Management. This quality manual will be reviewed at least annually for any material changes that may be needed.
6. Quality planning is conducted to ensure the requirements for product quality are met. Requirements for quality planning are accomplished during the product design and test development cycles and are defined in the applicable specifications.
7. Maxim reserves the right to adjust, amend and interpret this Product Assurance Program as necessary to maintain appropriate integrity of products and services. Specific contractual agreements with regard to Product Assurance activities or change notification shall be controlled via specific documentation established for the contracting agency involved, and not per this Product Assurance Program.


### Detailed Requirements

#### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

#### Maxim Specifications:

10-3006	Product Reliability Qualification
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## 3.0 Organization

### Policy


The organizational structure of the Quality department at Maxim allows for the freedom to identify, evaluate quality problems, and to initiate, recommend or provide solutions.

The Quality organization is independent of other corporate functions (e.g. TR&D, Product Development, and Manufacturing Operations) and is a direct report to the CEO.

### Description

It's the responsibility of all organizations to be continually aware of all aspects of their operations which may affect the final quality outcome of a product. Maxim's Quality Assurance System is set up as a vehicle to provide this awareness. The Quality Assurance System does this through prevention, manufacturing monitors and corrective action. Maxim's QA & R organization has the responsibility and authority to:

1. Qualify new processes, products, vendors, materials or equipment through appropriate evaluations and re qualify if significant changes are made which could affect compliance to established programs or customer contracts.
2. Establish open lines of communication between other Maxim organizations, customers and vendors for the purposes of effective translation of Maxim's requirements, resolving any quality or reliability concerns and implementing corrective actions.
3. Maintain an effective inspection system that assures conformance of products and services to customer requirements. It is the responsibility of the Quality Assurance organization to maintain all in-process monitors and to ensure that the data derived from such monitoring is reported to management in a timely manner.
4. Create and institute policies and procedures, in conjunction with other organizations, that form an effective Product Assurance Program and audit these for compliance.
5. As a routine, QA audits the factory for compliance to established practices and processes and promotes self-education through feedback of these audit results to the appropriate organization.
6. The QA & R, the Manufacturing, and the Design organizations are empowered by the company CEO to halt production if significant deviations from accepted practice are discovered which could jeopardize the quality or reliability of the product or result in a noncompliance to required standards, such as customer contracts and international or military standards.
7. The Vice President responsible for quality is ultimately responsible for setting the direction of new improvement programs, approving implementation plans for new programs, requesting correction of discrepant programs, and ensuring compliance to all requirements including 883 ISO 9001 and ISO/TS16949.
8. Quality Assurance Managers, or equivalent, implement the directed strategies into workable tactics. The Quality Assurance Managers, are responsible for the identification of resource needs and for bringing them to the attention of Quality Management. They are also responsible for alerting Quality Management when discrepancies are found, when a need for a new program exists, or when implementation of a strategy becomes impractical.
9. Everybody is responsible to promptly inform the QA and the Production Management of products and processes which do not conform to requirements. This requirement includes focus on lean manufacturing principles and the link to the effectiveness of the quality management system.
10. Customer Service, Sales and QA management are responsible and authorized to ensure that customer requirements are addressed.

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11. Facilities Managers and Maintenance Managers are responsible to coordinate multi-disciplinary approach for developing plant, facility and equipment plans and evaluating results.
12. Top management shall review the organization's quality management system at planned intervals to ensure its continuing suitability, adequacy and effectiveness.
13. Top management shall prepare contingency plans to satisfy customer requirements in the event of an emergency such as utility interruptions, labor shortages, key equipment failure and field returns. Product safety, if applicable should be addressed as well.


## Detailed Requirements

### Standards:

MIL-Q-9858                      Quality Program Requirements

### Maxim Specifications:

10-0006                          Quality Responsibilities

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## 4.0 Quality Objectives and Continual Improvement

### Policy

Quality goals and objectives will be set for departments, groups and individuals to ensure the organization is working in concert toward a common purpose which is consistent with the overall Maxim quality policy. Quality objectives support the Maxim quality policy by requiring continual improvements in the areas that provide the best opportunities for customer satisfaction and improved profitability.


### Description

1. A quality objective is any measurable objective to improve the performance of the company as it relates to the principles outlined in the quality policy.
2. Quality objectives are specific recommendations for improvement of a product or a process (see Attachment A and D).
3. The primary vehicle for setting and communicating quality objectives is the quarterly management by objectives program in which designated individuals, such as managers and engineers, all participate.
4. Ideas for improvement can come from anywhere in the company. A key source will be the scheduled reviews of the quality management system.
5. Quality Management will recommend specific quality objectives to managers in other departments. These objectives will be entered into the quarterly goals for key managers and engineers in areas designated for improvement.
6. Specific quality objectives, established every quarter to support the overriding corporate level goals, will be set in one or more of the following general categories, considering the availability of resources and the need for improvements.
  - Lower cost of producing and selling products and services
  - Decrease the rate of scrap and rework (to include control and reduction of variation in product characteristics and manufacturing process parameters)
  - Decrease the rate of customer returns
  - Decrease the rate of customer complaints
  - Lower cycle times
  - Decrease the response time to customer queries

### Detailed Requirements

#### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

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## 5.0 Specification Review System

### Policy

Customers routinely reflect their individual requirements of Maxim product through the use of Source Control Drawings, Specifications. These requirements shall be handled in a controlled fashion such that the said requirements are understood, translated and distributed to the appropriate department and personnel and implemented.

### Procedure

1. Customers submit their requirements in the form of general requirements, customer specific requirements and source control drawings. These requirements are routed to the Specification Review department which determines if a review is necessary, and if so, assigns a unique tracking number as appropriate. Specification Review will route the requirements for review in a timely manner.
2. Each reviewing department will evaluate the specific requirements pertinent to their responsibility. They will then identify their capability to conform to these requirements, request further clarification of the requirements and detail what resources not presently available would be necessary to substantiate conformance.
3. The specification review personnel consolidate all inputs into an easily decipherable explanation for approval and submission to appropriate parties (Business Unit Manager or Account Manager or Customer Quality Managers)
4. Specification Review then develops a formal response. The formal response will contain Maxim's assessment of capability.
5. The review is re-assessed by the Specification Review Manager. If there are any requests for waivers, it will be reflected in the response. Otherwise, the customer's requirements are re-assessed and work instructions are generated or incorporated in the current specifications in order to facilitate the processing of the material through the factory. Work instructions then become controlled documents. The effectivity date of this document is the effectivity date of the change.
6. Any changes made by the customer to these requirements will be evaluated in the same way as the initial review. Any changes required by Maxim will be summarized in notification sent to appropriate personnel (Business Unit Manager, Account Manager and Customer Quality Manager). The appropriate manager will then send input to the customer for notification. Material will not be processed until customer approval is received.
7. Once a Maxim requested change is granted, section 5 (above) is repeated.
8. Specification Review archives all pertinent documents associated with the review


### Detailed Requirements

#### Standards:

MIL-Q-9858	Quality Program Requirements
ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

#### Maxim Specifications:

71-0001	Customer Specification Review System
71-0003	Customer Special Numbering, Custom ASIC Circuit Number/Part Numbering Assignment and Creation of Customer Special Lot Numbers.

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## 6.0 Customer Communication and Satisfaction

### Policy

Maxim will maintain a focus on its customers, the very foundation of our business. We will strive to meet or exceed customer expectations, and ensure that there is clear communication between the customer and Maxim. Requests for information or complaints will be promptly responded to.

### Procedure

1. Product information will be presented through a public web site, from which customers may download product information and announcements and request samples; through visits to customers or visits by customers; or by direct mailings or telephone contact.
2. Any employee who has direct communication with customers will be aware of the formal complaint handling systems (Customer Corrective Action Requests) and the returned material authorization (RMA) system.
3. The RMA system will be documented. The QA department shall produce reports to track complaints and cycle times of responses to customers. See section 16.0 of this manual for detailed requirements.
4. Corrective action requests from customers shall take priority over other planned activities and must receive immediate attention.
5. All customer requests for specification reviews will be handled using the formal specification review system described in the section 5.0 of this manual.
6. Product changes requiring customer notification will be handled through the formal Product Change Notification procedure before shipments are made.
7. The Customer Service department is chartered to handle all requests from customers regarding placement of orders, changes to orders, status of orders, delivery issues, customer disruptions including returns, or general queries for information.
8. Data pertinent to customer satisfaction or dissatisfaction will be tracked by the Customer Service and/or Customer Quality Department and used as opportunities for continual improvement. Such data will form a part of the input to the Quality Management Review. Departments/employees involved in customer satisfaction or dissatisfaction will be informed of details for proper corrective and preventive action.


### Detailed Requirements

#### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

#### Maxim Specifications:

71-0001	Customer Specification Review System
10-0005	Corrective Action Procedure
10-0022	Product Change Notification Procedure
10-0115	Customer Returns Analysis RMA Procedure

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# 7.0 Product Traceability

## Policy

All product is to flow through manufacturing and inspection activities in a controlled fashion defined by a traveler, routing card and Computer Aided Manufacturing (CAM) process sequence. The identity of the process and materials used during manufacture shall be maintained up to and through customer receipt.

## Procedure

1. Military Products
  - A. Every product is marked with a unique traceability code that goes beyond the usual standard date code. This code provides traceability through assembly, die type/revision, fabrication location and fab lot number.
  - B. Through this code, traceability to the inspection lot is maintained.
  - C. Each product is processed through a pre-defined sequence of manufacturing and inspection steps. This sequence is defined through the CAM system and is supplemented by the use of a paper lot traveler.
  - D. During processing, the date each step is performed, the operator's signature, quantity in and quantity out shall be recorded as a minimum.
  - E. Process and material traceability shall be maintained on file for a specified length of time.
2. Commercial Products
  - A. These products are traceable in the same fashion as Military Products with the exception of traceability to raw materials
3. Automotive Products
  - A. These products are traceable in the same fashion as military products.


## Detailed Requirements

### Standards:

Mil-Std-38510                      General Specifications for Microcircuits

### Maxim Specifications:

10-0125	Date Code Format Procedures and Criteria
11-0030	Marking of Chip Scale and Flip-Chip Packages
07-0032	Marking File Database
17-0361	Maxim Lot Number Breakdown
17-0362	Backmark Breakdown
17-0552	Lot Traceability Requirements
33-xxxx	General Lot Travelers
71-0003	Customer Special Numbering, Custom ASIC Circuit Number/Part Numbering Assignment and Creation of Customer Special Lot Numbers.

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## 8.0 Records and Record Retention

### Policy

Records shall be sufficient to provide for analysis of conformance to customer requirements, incidents or trends affecting product quality or reliability and to provide evidence to support corrective action or effectiveness of corrective action implemented.

### Procedure

1. Each area affecting product quality shall identify and maintain records of activities in their area.
2. As a minimum the following records shall be maintained for the period specified in the record retention document # 10-0007
  - A. Training: Records shall be maintained for each employee who is processed through an operational training program. The records shall describe the operation for which the employee was trained, the trainer, results of examinations and date of certification. Re-training is done on a 6 month or an annual basis, depending on the operation.
  - B. Failure Analysis Reports: These are sequentially filed by receipt number and detail the analysis steps, conclusion, discussion, background, verification of failure, assignment of failure activating cause, date of completion and corrective action.
  - C. Changes in Design, Materials or Processing: These records are originated by the use of Engineering Change Notices (ECN's). Any change in the approved Military Product Baselines, Commercial Product or Automotive Product will be documented and controlled through an ECN.
  - D. Calibration: Records regarding the calibration history of equipment shall be maintained. This history will include the calibration certificates received from in-house calibration or subcontracted calibration source.
  - E. Utility: Records regarding Environmental controls or maintenance of such control shall be archived.
  - F. Statistical Quality Control: All statistical records shall be archived. These records shall indicate or reference documentation detailing action taken when out of tolerance conditions were identified.
  - G. In-Process Inspection Operations:
    - 1). Military Products shall have all inspection operations documented as to the type of inspection, tests or inspections made, the materials group inspected, the controlling documentation, date of inspection, the amount of material tested (sample size) and disposition. These records consist of lot travelers, assembly travelers, wafer fabrication travelers, or Inspection reports.
    - 2). Commercial Products shall have all inspection operations documented as to the type of tests or inspections made, the date of inspection, the amount of material tested and disposition. These records consist of the lot travelers, wafer fabrication travelers, assembly travelers, CAM system or final QA lot disposition.
    - 3). Automotive Products shall have all inspection operations documented as to the type of tests or inspections made, the date of inspection, the amount of material tested and disposition. These records consist of the lot travelers, wafer fabrication travelers, assembly travelers and CAM system or final QA lot disposition.

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- H. Incoming Inspection Operations: Records shall be maintained that show the incoming inspection performed and the results. If applicable, the MRB disposition of discrepant incoming material will be shown.
- I. Final Inspection:
  - 1). Military Products will have the final lot acceptance documented in accordance with Mil-Std-883 requirements.
  - 2). Commercial Products will have the final QA lot acceptance documented.
  - 3). Automotive Products will have the final QA lot acceptance documented.
- J. Internal quality audit records
- K. Characterization records that are used to demonstrate conformance for Automotive Products will be maintained for the production and service life of the part plus one full calendar year or until characterization for the part has been updated.
- L. Production Part Approval files for automotive devices.
- M. Management review records
- N. Supplier audit records
- O. Internal and external laboratory records
- P. Corrective and preventive action records
- Q. MRB and Nonconforming material records


## Detailed Requirements

### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

### Maxim Specifications:

04-7027	Environmental Controls Procedure
08-0131	Training and Certification Program
08-2001	Maxfab San Antonio Training and Certification Program
08-4736	Training and Certification Program" [X3]
08-7356	Training Procedures" [MFN]
10-0005	Corrective Action Procedure
10-0007	Record Retention Specification
17-2009	Inspection of Critical Materials for Maxim San Antonio
10-0108	QA Lot Acceptance (Buy-Off ) Procedure
10-0155	Calibration System Requirements
10-2778	Incoming Inspection System for Critical Materials
10-4530	Inspection of Critical Materials at X3 and SA
10-7026	Maxim North Customer Service Quality Records
11-0128	Document Control Procedures

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## 9.0 Personnel Training

### Policy

In order to maintain a consistent and repeatable manufacturing process, each operation in that process must be performed in a consistent and repeatable manner. Where that operation depends on the actions of an operator, that operator shall be trained, tested, and certified to an established level of proficiency. The training certificates establishing proficiency shall be kept in the employee's training or permanent file.

All other employees are considered to be qualified as a condition of and as a consequence of their being hired. Managers are responsible for identifying any additional training needs of their subordinates and keeping records of additional training completed. Employee evaluation form may be used for recording the training needs of employees.

### Procedure

1. Manufacturing Training Coordinators have the charter for providing centralized support for training and certification by:
  - A. Maintaining developed courses or developing new training courses if none exist.
  - B. Development of training skills of manufacturing area trainers and providing support to them.
2. Maxim management (QA & R and Manufacturing) will decide which operations require training and certification. A list of these is presented in the specifications addressing this topic.
3. The Training Coordinator's functions shall include:
  - A. Performing On-the-Job training or administering the established training exams.
  - B. Retesting or recertifying as required including training related to new or changed documents/criteria.
  - C. Maintaining training and certification records.
  - D. Evaluate operator performance to ensure that a proper level of proficiency exists.
  - E. Qualify/certify for new and modified jobs
4. QA & R will audit the training and certification activities for compliance and effectiveness.
5. Statistical training is covered in the Statistical Techniques section of this document.


### Detailed Requirements

#### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

#### Maxim Specifications:

08-0124	Training and certification Guidelines
03-08-0166	[TH] Maxim Thailand Training Procedure
08-0131	Training and Certification Program
08-2001	MAXFAB San Antonio Training and Certification Program
08-4736	Training and Certification Program (X3)
08-7356	Training Procedures (MFN)
08-0208	Training Certification and De-certification Procedure for Maxim Assembly
08-0349	Basic requirement Outlines for R&D Operators
08-0414	R7D Support Services Personnel Training Requirements
08-0401	WLP Training and Certification Procedure
08-4039	UCSP/WLP Training materials Tape and reel Process
08-4040	UCSP/WLP Training Materials Post tape and Reel Visual Inspection
18-0793	Job Assignment and Training Plan
18-6081	Training Attendance Logsheets

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# 10.0 Equipment Maintenance, Calibration and Measurement System Analysis


## Policy

Measurement and test equipment shall be capable of the required accuracy and shall be calibrated and maintained to the requirements of ANSI Z540. The equipment shall have documented maintenance and calibration procedures to ensure continuing process capability. The equipment is to be calibrated by trained personnel. Records of maintenance and calibration will be maintained and the calibration status of any item will be clearly visible. When equipment is found to be out of calibration, the validity of previous inspection results will be assessed and documented.

For Measurement System Analysis (MSA) requirements, Gage Repeatability and Reproducibility Studies (GR&R) are being used. For new technologies or equipment the full requirements of MSA will be implemented.

## Procedure

1. All test and measurement equipment will be entered into the calibration system. The requirements for maintenance and calibration must be reviewed by the maintenance staff. Calibration certificates supplied with the equipment, substantiating compliance to ANSI Z540, are acceptable and will be used in lieu of re-verification.
2. Procedures for maintenance and calibration are to be written if the manufacturer's instructions are unclear, ambiguous, or not applicable to the environment in which the equipment is used. The procedures are to define the type of maintenance/calibration, standards to be used and frequency and acceptance criteria.
3. Maxim shall utilize predictive maintenance methods, where applicable, to continually improve the effectiveness and the efficiency of production equipment.
4. The calibration status of each piece of equipment shall be clearly visible.
5. Equipment that is past due for calibration is to be identified, tagged and immediately removed from use in production. Notification/recall lists are sent to each area manager at a minimum of once per month.
6. An equipment history shall be kept on each item recording the equipment description, frequency of calibration, date of last calibration, date due for next calibration and calibration results. Certificates of calibration shall also be kept in the file.
7. Calibration standards or secondary standards are to be traceable to NIST. If NIST standards are not available, the calibration shall be in relation to a known physical constant or to an alternate reproducible government or commercially available standard.
8. Test hardware and software will be safeguarded from adjustments which could invalidate the calibration.
9. Inspection, measuring and test equipment will be handled and stored such that the accuracy and fitness for use will not be degraded.
10. Section 29 of this manual lists the calibration laboratory manual provisions for both internal and external laboratories.
11. Non-favorable calibration results will be handled according to general calibration procedure # 10-0155.
12. Computer software used for monitoring and measurement of specified requirements shall be confirmed prior to initial use and at regular interval.

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- 13. All equipment listed in the control plan for measurement shall be subjected to MSA or GR&R as per applicable procedures once and upon change or modification of the equipment.
- 14. GR&R acceptability can be by %GRR or by %GR&R to Tolerance depending on purpose and coverage of measurement and as applicable.
- 10. Employee owned equipment shall be subject to the provisions of calibration procedure # 10-0155

**Detailed Requirements**


**Standards:**

ISO 9001                      Quality Management Systems - Requirements  
 ISO/TS16949                Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

AIAG Measurement System Analysis Reference Manual

**Maxim Specifications:**

10-0155                      Calibration System Requirements  
 16-xxxx                      General Calibration and PM Procedures  
 77-0008                      Measurement System Analysis

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# 11.0 Internal Quality Audits

## Policy

The QA & R organization is responsible for establishing and maintaining an internal self audit program for the purposes of ensuring corporate compliance to internal procedures, customer contracts and Military specifications and the Product Assurance Program.

The QA & R organization is also responsible for establishing and maintaining Quality Management System Audit, Manufacturing Process Audit and Product Audit as applicable in each area to be audited.

## Procedure

1. QA & R will have independent auditors assigned within their organization who will conduct and oversee the operation or area audit.
2. The audits shall consist of checklists and guidelines established and entered into document control. Checklists shall be used as a tool to help perform the audit. These checklists are controlled documents and are revised in accordance with referenced standards. In addition, result of previous audit should be added as emphasis to the audit.
3. Frequency of audits for any area is at least annually. If an area fails the audit by having major discrepancies, then a re-audit is to be scheduled upon completion of the corrective actions.
4. Corrective actions agreed upon after an audit will be verified in the subsequent audit or sooner as deemed necessary by the auditor
5. Any audit deficiencies will be written and discussed with the area manager before publication. The deficiencies will be reviewed by the QA & R organization for evaluation of the impact upon the manufactured product.
6. The audited area, found to have deficiencies, is expected to correct the problems in a timely manner. A written commitment from the area manager is to be submitted, defining the timing and corrective actions to be undertaken in order to correct the identified problems.
7. The QA & R auditor will evaluate the proposed corrective action, ensure adequacy, and verify its initiation.
8. The completed audit will be filed and kept for a minimum period specified in document #10-0007
9. Management will routinely review the quality systems based on the audits. Quality management at each site will issue quarterly reports to Executive Quality Management on audit status, identifying commitments from each area, highlighting open action items, or commitments not forthcoming.
10. List of Internal Auditors are maintained by each facility and reported to HQ QMS Manager on a regular basis.


## Detailed Requirements

### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

### Maxim Specifications:

10-3232	Audit Program/Schedules
10-0005	Corrective Action Procedure
10-0007	Record Retention Specification
18-XXXX	ISO/TS16949 Compliance Checklist

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## 12.0 Material Handling, Preservation, and Storage

### Policy

All critical manufacturing materials and piece parts shall be handled in a manner that prevents their damage, loss, deterioration, degradation or loss of identity. In particular, Electrostatic Discharge protection shall be provided for sensitive devices whenever handled.

### Procedure

1. Each manufacturing and inspection operation shall have documentation which substantiates the identification of the material, segregation of unqualified material and work in-process.
2. Each area shall provide proper storage for the materials and work-in-process which are not being currently processed.
3. Material shall be identified as to its test and inspection status.
4. Static sensitive material shall be handled in accordance with accepted and established ESD controls and only at a static safe workstation.
5. Materials requiring age control shall be identified and stored in a manner which allows sufficient control and does not hasten the time limit for usefulness.
6. Inventory Management System shall be employed to optimize inventory turns over time and assure stock rotation such as FIFO.
7. It's the responsibility of area supervisors and management to ensure that their personnel are trained and in compliance with approved material handling, storage and preservation procedures.
8. The QA & R organization will audit each area to verify that procedures are being properly followed and that materials are being properly stored, handled, preserved and controlled
9. Boxstock product that is over two years old will be segregated, tested and remarked, if possible, to verify that it meets current product assurance requirements.
10. The company has no customer property in house but should there be in the future, it will be treated like Maxim's regular material, product and equipment and will be handled in accordance with applicable procedure
11. QA & R in conjunction with Facilities and Legal Departments is responsible to see to it that all Quality Management System activities are done in compliance with government, safety and environmental regulations as applicable.

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## Detailed Requirements

### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements
ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations

### Maxim Specifications:

02-0005	Dry Pack Barrier bag Procurement Spec
02-0101	Age Sensitive materials/Chemicals Control
07-0075	Corporate Tape and Reel Work order Procedure
07-0077	SMD Tray Packaging Requirements
07-7169	Finished Goods Receiving Procedures
10-0068	Finished Goods QC Procedures
10-0111	Handling and Protection of Electronic Static Devices
10-0193	Age Control Material Specification
10-2511	Protecting Product Quality
10-4530	Inspection of Critical Materials at X3 and SA
17-0181	Post PT Wafer and EOL Scrap and Reclaim Procedure
17-0203	Packaging and Storage of Processed Wafers and Die
17-2009	Inspection of Critical Material for Maxim San Antonio

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## 13.0 Final Outgoing Inspection, Packaging and Shipping

### Policy

Product that has successfully completed all prescribed manufacturing steps will become available for shipment. Prior to shipment, a QA Outgoing Inspection ("Plant Clearance") will be performed to ensure compliance to the order, customer contract and internal specifications. The material will be packaged in means that will prevent damage and protect the product from any normal shipping occurrence while maintaining traceability.

### Procedure

1. Materials/devices should be packaged for transport or delivery in such a way to protect it from damage and deterioration. Manufacturing will define the acceptable material and containers to be used for shipment, unless specified by contract. All materials used will be of an ESD protective nature.
2. Shipping personnel will prepare all necessary shipping documentation for review by the QA Plant Clearance Inspector.
3. The Plant Clearance Inspector reviews this documentation and verifies compliance to Maxim's internal standards as well as customer imposed requirements.
4. Once the documentation review is completed and compliance has been verified, a C of C (certificate of compliance) and/or a C of O (certificate of origin), if required, is filled out and sent with the shipment.
5. Shipping logs and QA Plant Clearance Logs are maintained for the purpose of product traceability.
6. Military product shipments will be reviewed and inspected by a QA MIL-STD-883 certified inspector prior to shipment. This review will consist of the lot traveler, End of Line processing and QCI data evaluation for adequacy.
7. Products for delivery should be handled in a manner as to protect it from damage and deterioration. Transport personnel or contractors should be properly trained for the activity. Transport equipment should be suitable to provide the necessary protection.


### Detailed Requirements

#### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

#### Maxim Specifications:

07-7231	Product Shipping Procedure
10-0113	QA Plant Clearance Instruction Manual
07-0006	Packing Matrix
07-4018	Processing of Lots in Tape and Reel
04-0319	Final Test Operation Work Method
10-0062	Reject Tag Procedure
07-7169	Finished Goods Receiving Process
10-0068	Finished Goods QC Procedure

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## 14.0 Final Lot Acceptance

### Policy

Upon completion of all pre-designated manufacturing steps, a material lot is submitted to Final Lot Acceptance ("Buy-Off"). This operation is a QA gate that has the charter to ensure that all material has been processed in compliance with established company procedures, customer contracts and in accordance with Military Standards.

### Procedure

1. Commercial Products and Automotive Products: Once a lot has completed its final processing step, it shall be submitted to QA Lot Acceptance. The QA Inspector performing this function then evaluates the lot traveler and other related documents submitted with the material. In addition, lot specific reliability data is evaluated at this time. A final disposition is conducted by QA, who inducts the lot into the appropriate stores location.
2. Military Product: The lot is processed similar to section 1 however, prior to the lot's release into Boxstock, QA MIL-STD-883 certified inspectors review the lot travelers and other associated documentation for adequacy. Only QA personnel certified to the MIL-STD-883 requirements are authorized to release 883B compliant product into Boxstock.
3. The Acceptance area shall be clearly identified and separate from other manufacturing areas. Material is to be held in this area until completion of the necessary quality conformance testing.
4. All records created during this function are to be filed for a minimum period specified in document #10-0007
5. If customer source inspection or Government source inspection is required, Maxim will inform the proper representative.
6. Once the QA review is completed and compliance is verified, the lot traveler is stamped and the lot is inducted into Boxstock by QA personnel. This QA stamp serves as a notice of lot acceptance by QA personnel.


### Detailed Requirements

#### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

#### Maxim Specifications:

10-0108	QA Lot Acceptance (Buy-Off) Procedure
78-0147	Control Plan for Final Visual Inspection/Outgoing QA and QA Buy-Off
10-0026	Induction Procedure
07-0054	Induction/Stocking Procedure

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## 15.0 Control of Vendors and Procured Items

### Policy

Vendors and suppliers of critical materials and services will be controlled in such a way as to ensure that products of consistent quality are received from an approved source. When a vendor or procured material is found to be discrepant against standards, appropriate corrective action will be taken.

### Procedure

1. All critical materials and services must be procured from approved vendors. Vendor approval may be granted based on the following subject to provision of document #10-2515:
  - A. Vendor site survey
  - B. Secondary approval granted by Maxim's end customer
  - C. First article inspection results
  - D. Established industry reputation
  - E. ISO 9000 series certification
  - F. ISO/TS16949 certification
2. Once adequate performance has been established and/or the vendor is approved, the vendor shall be listed on the "Approved Vendors List. Mergers, acquisitions or affiliations associated with suppliers warrants verification of Approved Vendor status.
3. All critical materials will be purchased and inspected in accordance with the applicable procurement document, customer and regulatory requirements, if any. The procurement document will specify the acceptance requirements and/or tests that the material must be capable of passing, and any additional requirements.
4. Verification of the above requirements may be substantiated by a vendor supplied C of C/A, and/or successful completion of incoming inspection or laboratory test.
5. When an Incoming Inspection report is generated, any discrepancies will be noted on this report. All discrepant material will be identified and dispositioned by using the MRB/eMRB system. Any material scrapped is submitted to the MRB/eMRB.
6. All material will be impounded until they have successfully completed the incoming inspection operation. No critical material shall be released to production before the shipment has passed incoming inspection
7. When it has been determined that material discrepancies are a result of a vendor quality problem, a Supplier Corrective Action Request may be initiated.
8. It is the responsibility of QA & R to ensure that all corrective actions are followed up and are resolved in a timely manner.
9. QA & R will summarize and review the incoming inspection results on a periodic basis with the appropriate group to determine or adjust the preferred vendor rating and list.
10. A vendor quality rating system will be used, as appropriate, for selected Maxim suppliers. The vendor quality rating may be a result of a vendor's historical performance through site surveys, shipment inspections, supplier corrective action requests, and/or other selected quality indices

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## Detailed Requirements

### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

### Maxim Specifications:

02-xxxx	General Material Procurement Specification
02-0031	Purchasing Procedure
02-0045	Approved EOL Subcontractor/Service Vendor List
10-0005	Corrective Action Procedure
10-0065	MRB Procedure
10-0082	Supplier Quality Assurance Manual
10-0114	Incoming Inspection System of Electrically Untested Units
10-1908	Receiving and Inspection of Hybrid Raw Material
10-2514	Quality Review Requirements for Procurement Specifications
10-2515	Candidate Supplier/Subcontract Quality Evaluation
10-2517	Assembly Subcontractor Performance Rating
10-2778	Incoming Inspection System for Critical Materials
10-4530	Incoming inspection of critical materials at X3
17-2009	Inspection of Critical Material for Maxim San Antonio
18-1269	Supplier Quality Site Audit Report
18-4445	Discrepant Material Report
62-0030	Approved Vendors List and Critical Materials Spec for Class Code 1
62-XXXX	Specific material Approved Vendor List

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## 16.0 Customer Returns Analysis Procedure

### Policy

In the event a product manufactured by Maxim is deemed not to have conformed to the end customer's contracted requirements, Maxim is committed to provide a comprehensive and timely response. This response will address the cause for non-conformance and the corrective action to prevent future recurrence.

### Procedure

1. When a customer has discovered it necessary to return material, under the supposition it is defective, the customer is to contact Maxim's Customer Service organization. Depending on the quantity or value of the return in question, either a Return Material Authorization (RMA) number is immediately assigned for the complete quantity, or only a sample is authorized for return.
2. Returned material is then logged in and sent to Quality Assurance for evaluation. If the material is returned for reasons other than "quality" related issues, a disposition is defined by the Quality Assurance Manager.
3. If the return is for quality issues, the material is submitted for failure analysis. The results of the analysis are then reviewed by Quality, Process Engineering, Marketing, Test Engineering, and/or Applications Engineering.
4. If corrective action is deemed necessary, it will be initiated by the QA & R organization. This organization will be responsible for notification and verification of effectiveness.
5. Marketing and Customer Service will then reconcile the customer's account by either crediting, replacing or reshipping the material.


### Detailed Requirements

#### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

#### Maxim Specifications:

10-0005	Corrective Action Procedure
10-0115	Customer Return Analysis (RMA) Procedure
10-0053	Control of Nonconforming parts Procedure
10-7089	Maxim Preventive Action Procedure
56-0018	Failure Analysis Program

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## 17.0 Material Review Board

### Policy

Any material found to be either unidentified, suspect or discrepant through incoming inspection, in-process inspection, or found to be deficient in comparison to accepted standards or the requirements of customer contracts, will be submitted for review and disposition by Maxim's MRB.


### Procedure

1. An entry is made into the MRB/eMRB system defining the discrepancy observed, the quantity of material tested, the test failing, the lot number, and material description. This report is submitted to the MRB for review.
2. The discrepant material is to be clearly marked as such and physically segregated from production material.
3. The MRB consists of the Maxim's executives (top management, manufacturing and quality). Any other personnel, whose experience or expertise is relevant to the proper disposition of the material may be called upon to provide input.
4. It is the MRB's charter to evaluate the discrepancies found, and determine the disposition of the material. The discrepancy is to be evaluated as to its possible impact on production, processing, reliability, or conformance to customer contract and regulatory requirements. If deemed necessary by MRB, customer will be informed of material status.
5. MRB dispositions material as: Use-as-is, Return to Vendor, Rework, or Scrap. The MRB is the sole authority allowed to disposition discrepant material, unless the authority is disallowed by customer contract. In this case the customer has sole authority for Use-as-is dispositions.
6. In the event material has been found to have a minor discrepancy that is not clearly a cause for a "Scrap" disposition, the MRB will notify the Business Manager, who will initiate a Request for Deviation or Waiver from the customer. All material affected by this discrepancy will be held from further processing or shipment until this waiver is accepted by the customer.
7. It is the responsibility of the MRB to make sure that procedure and guidelines for rework is available.
8. MRB transactions will be kept on file for a minimum period specified in document #10-0007.

### Detailed Requirements

#### Maxim Specifications:

10-0005	Corrective Action Procedure
10-0534	Request for Deviation or Waiver
17-0622	Inventory Control Procedure for Processing MRB/ eMRB Material

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# 18.0 Document and Data Control System

## Policy

All procedures, specifications, processes, test programs and other documentation for the consistent manufacture and maintenance of Maxim's quality standards, shall be documented and controlled. All document changes will be handled in a controlled manner, and not implemented unless approved by pre-designated personnel.

## Procedure

1. As part of a product's introduction into production, all initial releases of datasheets, test programs, burn-in board diagrams, test schematics, GBD studies, DFMEAs, design reviews, etc., must be entered into Document Control by issuing an ECN.
2. Document Control will maintain a minimum sign-off list for each type of ECN. This list will define the personnel necessary for approval. After approval, obsoleted documents are removed from all control points and replaced with the current version and/or marked as obsolete.
3. Any change to the initial baseline will be documented by the subsequent ECN's. The ECN will describe the change, the reason for change, the effect it has on boxstock, material in line, and material shipped, affected documents and the date the change becomes effective.
4. All ECN's will be numbered, tracked, and archived in a controlled fashion. The completed ECN's will be archived in Document Control. In addition, Document Control will maintain a current master list of all controlled documents and make it readily available.
5. Changes classified as major which impact form, fit or function, will require product re-qualification per the guidelines defined by MIL-STD-883, ISO9001 and ISO/TS16949. In addition, Notification of Design Changes will be issued to customers requiring this service by contract, or who are entitled per MIL-STD-883, ISO9001 and ISO/TS16949. Notification of product/process changes will be handled through the Product Change Notification Procedure # 10-0022.
6. Minor changes may be made without customer approval or notification at the discretion of Maxim.
7. Maxim's Product Assurance Program recognizes five levels of documentation needed to assure quality. They are:
  - A. The quality policy
  - B. The quality manual
  - C. Quality system procedures (10-xxxx)
  - D. Other procedures and work instructions
  - E. Forms
8. Changes made to a document shall be a reason to check the effect on related, linked or referenced documents (i.e. PPAPs, FMEAs, Control Plans, etc.).


## Detailed Requirements

### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations
MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

### Maxim Specifications:

10-0022	Product Change Notification Procedure
11-0128	Document Control Procedures

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# 19.0 Corrective and Preventive Action System

## Policy

Corrective actions are concise plans that are designed to remedy identified areas of factory discrepancy. Corrective actions are designed to eliminate the cause of nonconformities in order to prevent recurrence. They are, by definition, of high corporate priority. The execution of an assigned corrective action is a necessity for maintaining a Product Assurance System that is effective, responsive and dynamic.

## Procedure

1. Once it has been identified that an operating discrepancy exists, a formal corrective action will be issued, the progress tracked and the effectiveness verified by the Quality Assurance organization.
2. Formal corrective action may be in the form specified in document #10-0005 or by the form specified in the particular Maxim operating procedure e.g. DMRs
3. Formal corrective actions are issued when:
  - A. Violations to established procedures are noted during audits or routine observation of operating activities.
  - B. Failure analysis results determine that corrective action is needed.
  - C. Discrepancies are found during In-process inspection, final lot acceptance or other inspection operations that could have allowed product exhibiting unreliable field performance to ship to customers.
  - D. The discrepancy can be related to product already shipped.
  - E. A customer contract requires it.
4. Three types of corrective actions exist at Maxim. These are Internal Corrective Actions, Supplier Corrective Actions, and Customer Corrective Actions.
  - A. Internal Corrective Actions are initiated when discrepancies are identified to be solely a part of the inner workings of Maxim.
  - B. Supplier Corrective Actions are generated as part of Maxim's subcontractor control program. These corrective actions require a written commitment and formal response from the subcontractor. If the discrepancy is found to be extremely significant, a vendor re-qualification audit may be instituted to verify the corrective action's effectiveness.
  - C. Customer Corrective Actions are requested by Maxim's customers or driven by a customer complaint or comment.
5. Several types of preventive actions exist at Maxim. They include:
  - A. Thorough review customer requirements to produce accurate and complete work instructions for how to build conforming products and services.
  - B. Document and control all requirements, procedures and work instructions.
  - C. Ensure that properly trained personnel are used in all areas.
  - D. Maintain identified test and inspection points to provide short feedback loops for control purposes, and to prevent non-conforming material from being processed further.
  - E. Maintain controls over vendor capabilities and incoming subparts to prevent defective material from reaching Maxim operation and/or the product.
  - F. Maintain a strong and effective corrective action process to prevent problem recurrence.
  - G. Hold regular reviews of quality indicators, including SPC data, to detect trends before defective product is built.
  - H. Where appropriate, document and control preventive maintenance procedures.
  - I. Corrective and preventive actions should incorporate error proofing techniques as much as possible.

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## Detailed Requirements

### Standards:

ISO 9001	Quality Management Systems - Requirements
ISO/TS16949	Quality Management Systems-Particular requirements for the application of ISO9001 for automotive production and relevant service part organizations
MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

### Maxim Specifications:

03-2024	Non-conforming material / DMR Process
03-7533	DMR Process & Non WIP Operation Procedures (Scrap Process, Stores Locations and Hold Operations)
10-0005	Corrective Action Procedure
10-7089	Maxim Preventive Action Procedure
78-0002	Process Failure Mode and Effect Analysis (PFMEA) Procedure
77-0007	Control Plan Preparation Procedure
18-0100	Eight Discipline report Form 8D
10-3006	Product reliability Qualification
78-0068	Control Plan for IQC Piece Parts
10-0128	Preventive Action Policy
16-0530	Calibration Procedure

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## 20.0 Inspection System

### Policy

Throughout the manufacture of product, sufficient inspections will be performed by manufacturing or QA & R inspectors to ensure that proper processing and standards of manufacture are continually upheld. The inspections are performed by trained personnel in accordance with established sampling plans. The status of the material will be clearly indicated and the results of the inspection recorded. Discrepant material will be dispositioned through the proper rework flow, or in the case where disposition is unclear, will be submitted to MRB for review.

### Procedure

1. When processing flows are initially established, inspection steps shall be inserted and documented at appropriate locations in order to evaluate the compliance of the material to requirements. The inspections and the acceptance criteria will be documented on the lot travelers.
2. All inspections, which are a verification of a 100% or critical production operation, will normally be performed by a QA & R Inspector. The result of these inspections will be logged and a report issued on a periodic basis describing production's performance to quality goals.
3. Maxim uses a sampling plan based on the 0.1%AQL, C=0 plan outlined in Nicolas Squeglia's book, "Zero Acceptance Sampling Plans", unless otherwise stated in applicable procedure documents for the inspection being performed. 0.1% AQL sampling is to be used at final lot acceptance inspections before inducting newly manufactured product into the warehouse for shipment to customers.

Other inspections done throughout the manufacturing flow may also use AQL sampling or may use LTPD sampling, depending on what is most appropriate for the given inspection step.

ISO/TS16949 requires C=0 sampling plans for all visual lot acceptance inspections.

4. Inspection performed by QA & R inspectors can be identified by the presence of an inspection stamp. These stamps will be issued and controlled by the Quality Assurance Department. This stamp identifies the inspector who released the product at a particular stage.
5. Inspection includes visual, dimensional and testing activities as required by the applicable inspection procedure.


### Detailed Requirements

#### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

#### Maxim Specifications:

01-xxxx	General Material Flow Charts
07-0094	Final Visual Inspection
10-0107	QC Inspection Stamp Control
10-0116	Inspection Stamp Control
10-1938	Statistical Sampling Plans
10-7008	MIL-STD-883 Second Optical Inspection Process
14-7004	Wafer Acceptance Visual Inspection (WAVI)
44-XXXX	Wafer Fabrication Process Flow, and Control Plan
78-XXXX	Test, Wafer Sort, Tape and reel and Shipping Control Plans

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# 21.0 Failure Analysis

## Policy

Upon the discovery of discrepant material, whether from the customer, discovered internally, or from another source, where the cause for the discrepancy is unknown and there is a concern that the discrepancy may reflect on the quality or reliability of the product, the product will be submitted for Failure Analysis. The QA & R organization will maintain an effective department with sufficient capabilities to perform analysis, whose end purpose is to try to assign a failure cause, so that corrective action may be initiated or supported.

## Procedure

1. Failure analysis requests that could decide the disposition of customer returned material/samples and other materials, are to be assigned an RMA number.
2. Each Failure Analysis is then logged in as to the date received, part number, customer, requester, observed failure mode and failure rate. A unique number will be assigned to each request. A notification of receipt is then sent to the requesting party indicating that the material has been received and analysis is beginning. The analysis is then logged out to a Failure Analysis Engineer.
3. The targeted completion time allotted for standard failure analysis is 3 weeks. At the end of 3 weeks, it is the responsibility of the FA Engineer to give a status to the requester and report the progress of the analysis, or forward the completed formal report to the requester.
4. The QA & R organization will have a system and defined techniques that allow analysis to be performed to the standards defined in MIL-STD-883 Method 5003 Condition B. Full failure analysis capability resides in-house.
5. All FA equipment shall be included in PM and/or calibration control.
6. Upon completion of the analysis, a formal report will be issued to the requester and the identified distribution list. If corrective action is needed the CAR # will be included in the report.
7. All documents relating to the Failure Analysis, including a copy of the final report will be contained within the report file. This file will be maintained for the period specified in document # 10-0007.


## Detailed Requirements

### Standards:

MIL-Q-9858	Quality Program Requirements
MIL-I-45208	Inspection System Requirements

### Maxim Specifications:

10-0005	Corrective Action Procedure
10-0115	Customer Return Analysis (RMA) Procedure
10-0152	Failure Analysis Procedures and Methods
10-0153	Flow Chart of Sources For Failure Analysis Samples Specification
56-0018	Failure Analysis Program
10-3006	Product Reliability Qualification
55-0020	Reliability/FA Laboratory Manual
56-0022	Failure Analysis Laboratory Manual for Operations, Methods and Procedures
56-0019	Failure Analysis Laboratory Manual

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## 22.0 Environmental Controls

### Policy

Manufacturing, inspection and storage areas are environmentally controlled where necessary so that activities in these areas will be clean, orderly and have an appropriate environment that is suitable to ensure product quality and reliability.


### Procedure

1. Environmental control standards are established for each area where necessary. These standards will refer to temperature, humidity, particulate count and vibration (where applicable).
2. The establishment of these standards is the responsibility of each area's manager in conjunction with Engineering. The control limits are recommended by the managers and reviewed for adequacy by the QA & R organization.
3. The environmental control limits for each area will be monitored. Temperature and humidity limits are recorded on a continual basis through the use of self recording instruments. Particulate counts are checked biweekly, unless the criticality of this area requires more frequent monitoring. The data from these monitors will be archived for period specified in the document 10-0007.
4. If the defined "absolute limits" are exceeded, processing of 883 compliant material will stop until the condition has been remedied. The QA & R organization will initiate and verify the effectiveness of the proposed corrective actions.

### Detailed Requirements

#### Maxim Specifications:

03-2015	Clean Room Protocol" - (SA)
03-4779	Clean Room Procedure" – (X3)
03-7034	Clean Room Procedure" – (MFN)
04-7027	Environmental Controls Procedure
09-0097	DI Water Specifications and Guidelines
09-0098	Microbiological Analysis of D. I. Rinse Water
09-0907	Wafer Fab Control and Environmental Specifications
09-2001	Wafer Fab Control and Environmental Specification at SA
09-7000	Environmental Requirements for Production Areas
10-0138	ESD Specification
10-2228	Airborne Particle Counter Procedure
16-7011	Airborne Particle Monitoring Plan
17-4145	Hybrid Temperature. & Relative Humidity Tracking Plan
18-1464	Industrial Waste Treatment Area Inspection
18-1467	Industrial Waste Treatment Logs

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## 23.0 Product and Process Realization

### Policy

For new product introductions, product and process realization planning, implementation and control are well-defined.

### Procedure

1. The process for product realization is available and ready for use for all new products. This includes the declaration of objectives, process documents, resources, verification and validation, inspection and test, criteria for inspection, records and customer requirements. (For ISO/TS16949, the Advanced Product Quality Planning Reference Manual is the reference/guide used).
2. Attribute data sampling for automotive devices shall have zero (0) acceptance level.
3. It is the responsibility of all personnel working on the development of customer contracted products and projects to safeguard confidentiality of information
4. Process to control changes that impact process realization has been defined. This includes assessing effects of change, verification and validation of change, review of changes with customer, customer notification as needed.
5. It is the multi-functional design team's responsibility to determine and review the customer requirements related to the product.
6. Customer communications of information relative to product and process realization (product information, inquiries, contracts or orders, customer feedback and complaints) as to channel and contacts has been defined.
7. Maxim is equipped with facilities for communication with the customer using commonly used transmission modes.


### Detailed Requirements

#### Standards:

Advanced Product Quality Planning and Control Plan AIAG Reference Manual (APQP)

#### Maxim Specifications:

30-XXXX	Die IOS ECNs or Design Review
77-0007	Control Plan Preparation Procedure
17-7001	Customer Product Introduction Procedure for Custom ASIC
44-0000	Process Master Index
51-0004	Product Design Procedure for Maxim & Dallas Products
52-0004	Wafer fabrication Process release Procedure
52-7001	Wafer Fab Process Development and Release Procedure
78-0002	Potential Failure Mode and Effect Analysis (PFMEA) Procedure
78-0143	APQP Procedure

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## 24.0 Design and Development Planning

### Policy

For each of the new product introduction, design and development planning activity is completed per applicable standard (ISO9001, ISO/TS16949, or Military Standard)

### Procedure

1. A multi-disciplinary Design and Development Planning Team will be formed for each new product introduction to include design, manufacturing, engineering, quality, production and others.
2. The team will be responsible for: (applicable for automotive)
  - a. development, finalization and monitoring of special characteristics
  - b. development and review of FMEAs, including actions to reduce potential risks
  - c. development and review of control plans, if applicable
3. The plan should include determination of :
  - a. design and development stages
  - b. review, verification and validation for each stage
  - c. responsibilities and authorities for design and development
4. The plan should manage interface between different groups involved in the design and development to ensure effective communication and clear assignment of responsibilities
5. The plan output will be updated as design and development progresses.
6. The design and development vital stages are as follows:
  - a. design and development input
  - b. design and development output
  - c. design and development review
  - d. design and development verification
  - e. design and development validation
  - f. control of design and development changes
7. The organization shall ensure the personnel with product design responsibility are competent to achieve design requirements and are skilled in applicable tools and techniques either as hired or as trained. Applicable tools and techniques are as specified in the design and new product procedures.
8. Design and development validation shall be performed in accordance with customer requirements, as applicable, including program timing.
9. Prototype program and control plans will be included in the APQP process when required by the customer.
10. Production part Approval Process (PPAP) will be completed according to AIAG PPAP Reference Manual.
11. Product and Process Initial Objective Specification (IOS) contains the plan for product introduction.
12. Process Design and Development input shall be identified and documented and reviewed including product design output data, targets for productivity, process capability and cost, customer requirements if any and experience from previous developments. This also includes application of error-proofing techniques if and when applicable to a degree appropriate to the magnitude of the problems and commensurate with the risks encountered.

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13. The organization shall identify special characteristics and include them in the control plan, comply with customer-specified definitions and symbols, if any, and identify process control documents including drawings, FMEAs, control plans and operator instructions with the customer special characteristic symbol or notation, if available, to include those process steps that affect special characteristics. Special characteristics can include product characteristics and process parameters.
14. The manufacturing design process output shall be expressed in terms that can be verified against manufacturing process design input requirements and validated. The manufacturing process design output shall include specification and drawings, manufacturing process flow chart/layout, manufacturing process FMEAs, control plan, work instructions, process approval acceptance criteria, data for quality, reliability, maintainability and measurability, result of error-proofing activities as appropriate and methods of rapid detection and feedback of product/manufacturing process nonconformities.
15. Design and development review, design and development validation and design and development verification is applicable to manufacturing process introduction as well.
16. Measurements at specified stages of design and development shall be defined, analyzed and reported with summary results as an input to management review. The measurements include quality risks, costs, lead times, critical paths and others as appropriate.
17. Changes to design and development of manufacturing process shall be properly and timely documented.


## Detailed Requirements

### Standards:

AIAG Advanced Product Quality Planning and Control Plan AIAG Reference Manual (APQP)  
 AIAG Potential Failure Mode and Effect Analysis Reference Manual  
 AIAG Production Part Approval Process Manual Reference Manual

### Maxim Specifications:

08-0078	Advanced Quality Planning (APQP) Training Text
08-0079	PPAP Training Text
11-0037	ECN Procedure for Changes to BOM'S in MAXCIM
17-7001	Customer Product Introduction Procedure for Custom ASIC"
18-0311	APQP Status Report
30-XXXX	Die IOS"
44-0000	Process Master Index"
51-0004	Product Design Procedure for Maxim & Dallas Products"
52-0004	Wafer fabrication Process Release Procedure
52-7001	Wafer Fab Process Development and Release Procedure"
55-0038	Qualification Requirements & procedures for Modules, SIPSTIKS and Other PCB Based Products
77-0007	Control Plan Preparation Procedure
78-0001	Automotive PPAP Procedure"
78-0002	Process Failure Mode and Effect Analysis (PFMEA) Procedure
78-0143	APQP

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## 25.0 Electrical Test

### Policy

All electrical test measurements used to gauge the acceptability of product or conformance to data sheets, customer contracts or other imposed requirements, shall be done on equipment under measurement system analysis (MSA) and calibration control. If applicable, test software will be entered into Document Control and revised in a controlled fashion.

### Procedure

1. All hardware or software will be generated by the Test Engineering organization. Prior to its installation into the production environment, its performance will be validated, and the appropriate documentation relating to all hardware and software will be placed under Document Control. If deemed applicable, regular validation will be conducted
2. All major equipment identifications and software program file names will be recorded on the lot travelers.
3. All equipment, prior to its release into production, will be "proved-in" and its specified accuracy and precision validated through measurement system analysis. The equipment will be entered into the calibration system.
4. Known Good Units (KGU's) are established for the purpose of set-up verification. These units are to be established by the Test Engineering organization, and critical parameters are recorded for each unit. Prior to the beginning of production test, the units are retested as a repeatability check and verification of set-up.
5. Customer supplied test fixtures and test programs, if any, will be handled in the same fashion as internally generated test fixtures/programs. It is the responsibility of the customer to ensure that proper documentation, measurement system analysis and evidence of calibration are supplied to Maxim. Maxim's QA & R organization will evaluate these and verify that they meet internally established standards, the customer is advised of any discrepancies. If the customer chooses to waive Maxim's control requirements, a written waiver is required prior to further processing or use of such programs/fixturing.
6. All QA electrical tests (cold, room, hot, and drift) are verified by QA.
7. Test Engineering is responsible for documenting suitable ATE, AC, noise and drift test methods as required to perform product performance verification per the EC table issued at the product design review.

### Detailed Requirements


#### Standards:

MIL-I-45208	Inspection System Requirements
MIL-Q-9858	Quality Program Requirements
MIL-STD-883	Test Methods and Procedures for Microcircuits

AIAG Measurement System Analysis Reference Manual

#### Maxim Specifications:

04-4028	Processing of Packaged Products
04-4553	Wafer Sort Procedure"
10-0045	QA Electrical Test System Requirements"
75-0001	Test Engineering Responsibilities"
77-0007	Control Plan Preparation Procedure
77-0008	Measurement System Analysis
78-0002	Potential Failure Mode and Effect Analysis (PFMEA) Procedure"

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## 26.0 Rework and Repair

### Policy

Rework/repair operations shall be undertaken using approved work instructions and procedures. These procedures will produce product that conforms to the standards of Quality and Reliability as well as non-Reworked/Repaired material. The rework/repair operations will be fully traceable to the affected material.

### Procedure

1. Rework: An operation performed on non-conforming product that restores all characteristics to a conforming state.
2. Repair: An operation performed on non-conforming product that compensates for the non-conformance and allows the circuit to meet the specifications required.
3. Process or Assembly Engineering will approve all rework/repair operations.
4. Rework/repair operations shall follow the limitations of MIL-PRF-38535 paragraph 3.7.1 and ISO/TS16949 para. 8.3.2 except where specifically agreed to by the customer.
5. When repair operations affect form, fit, or function of product, the customer will be notified and shipments will not proceed without prior written approval of the repair from the customer.
6. Product that has been subjected to rework/repair shall be resubmitted to the test and inspection pertaining to the aspects of the rework or repair.


### Detailed Requirements

#### Standards:

MIL-I-45208	Inspection System Requirements
MIL-Q-9858	Quality Program Requirements

#### Maxim Specifications:

03-0270	Wafer Fabs Rework Policy
04-0317	Module and Socket Electrical Rework Procedure
07-0104	Paint and Remark
11-0128	Document Control Procedure
11-0037	ECN Procedure for Changes to BOMs MAXCIM Procedure"
20-0132	Module and Socket Rework-Bubble Fill/Solder Dip
20-0143	Solder Rework Procedure
33-XXXX	General Fab Lot Travelers]"

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## 27.0 Customer or Government Source Audit Inspections

### Policy

Maxim welcomes customer or government source/audit inspections for the purpose of fulfilling contract requirements, quality surveys, or annual auditing. Customer or government representatives will be accommodated such that the requirements of the audit/inspection will be accomplished. Maxim will provide the necessary personnel, resources, and facilities at their disposal.

### Description

1. Audits/inspections are to be scheduled through Maxim's Sales, QA or Customer Service organizations. Maxim's S/QA/CS organization will identify and organize the visit. An agenda will be established and approved by all other organizations involved.
2. A contact, usually the regional S/QA/CS person, will be assigned to interface and handle specific details with the customer. Usually, a Quality Assurance representative will also accompany the inspector through the various QA systems, manufacturing operations, and inspections.
3. Access to operations, equipment, facilities, and materials will be provided as long as this action is not overly disruptive to normal operations.
4. Audit results will be formally or informally (at the customer's discretion) reviewed upon the completion of the audit/inspection. All discrepancies will be documented and defined in such a way that the corrective actions can clearly be derived. A full understanding as to whether the noted deficiency is due to non-compliance or specifications, or is a recommendation, is necessary.


### Detailed Requirements

#### Standards:

MIL-I-45208                      Inspection System Requirements

#### Maxim Specifications:

N/A

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## 28.0 Statistical Techniques

### Policy

Engineering, Manufacturing, and Quality Assurance shall use valid statistical techniques to objectively quantify processes and products performance and quality. Maxim promotes the use of statistical techniques when developing, qualifying, maintaining, and improving processes or products. Management and QA will identify where statistical techniques are needed for establishing, controlling and verifying process control, process capability and product characteristics. Management and QA shall establish and maintain documented procedures to implement and control the application of statistical techniques.

### Description

1. Statistical Process Control (SPC) is used to stabilize processes and identify assignable causes. Personnel involved in the SPC program are trained in their particular area of participation like data entry, interpretations, Problem Solving techniques, Control Charting, and SPC Theory. Control charts are implemented based on recommendations from teams, individuals, and industry standards. Management determines which processes are monitored by Process Capability (Cpk). The Quality Assurance Department and/or particular department are/is responsible for training and for maintaining reference material.
2. Design of Experiments (DOE) is used to optimize processes and to make processes more robust. DOE techniques are considered preferable to single factor experiments. Because DOE is considered an advanced technique, personnel using DOE should consult reference material available in the Quality Assurance Department or particular department.
3. Tests of Significance, T-tests, F-tests, and Analysis of Variance (ANOVA), are used by personnel performing basic comparative studies. These tests are considered objective support to recommendations and hypotheses. Reference material is available in the Quality Assurance Department or particular department.
4. Statistical Sampling Plans for inspections are based on the 0.1% AQL, C=0 plan "Zero Acceptance Number Sampling Plans" by Nicholas Squeglia and MIL-STD-883 Method 2005. Maxim's Acceptable Quality Limit (AQL) is 0.1%, C=0 for both mechanical and electrical requirements of assembled units, except where other plans are required.
5. Additional techniques, such as, descriptive statistics, problem solving tools, regression, probability plots, and residual analysis are used where appropriate. Problem solving tools include: Pareto Charts, Cause & Effect Diagrams, Process Flow Diagrams, Histograms, and Scatter Plots.


### Detailed Requirements:

#### Standards:

MIL-STD-883 AIAG	Test Methods and Procedures for Microcircuits Statistical Process Control Reference Manual
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#### Maxim Specifications:

10-0009 03-0296	Maxim SPC Manual" Prime General Procedures
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## 29. Laboratory Requirements

### Policy

Maxim maintains internal laboratories to conduct or perform reliability testing, failure analysis and calibration in conformance to ISO/TS16949 requirements. The laboratories will have capability to perform tests as required by applicable standards (AEC-Q-100, Mil-Std, JEDEC, etc.). Maxim will use qualified external laboratories if and when needed.

### Description

#### A) Requirements for Internal Laboratory

1. The internal laboratories shall have defined scope that includes its capability to perform the required inspection, test or calibration services.
2. The internal laboratory shall specify and implement, as a minimum, technical requirements for:
  - adequacy of laboratory procedures
  - competency of laboratory personnel
  - testing of the product
  - capability to perform services correctly, traceable to the relevant process standard (such as ASTM, EN, etc), and
  - review of related record.

#### B) Requirements for External Laboratory

1. The external laboratory shall have defined laboratory scope that includes the capability to perform the required inspection, test or calibration,
2. The external laboratory should either:
  - have evidence that the external laboratory is acceptable to the customer or
  - have accreditation to ISO/IEC 17025 or national equivalent.


### Detailed Requirements:

#### Standards:

ISO/IEC17025                      Laboratory Certification Standard

#### Maxim Specifications:

10-3006	Product Reliability Qualification
10-4009	Calibration laboratory Manual – X3/HQ
10-0021	Calibration Laboratory Manual – EV
16-0523	Calibration Manual - DS
16-4037	Calibration laboratory manual –MPOC/MIPT
55-0020	Reliability Laboratory Manual-HQ
55-0034	Reliability Laboratory Manual“- EV
56-0013	Failure Analysis Procedures and Methods
56-0019	FA Laboratory Manual – Maxim
56-0022	FA Laboratory Manual for Operations, Methods, and Procedures – DS

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## 30. Control of Nonconforming Products

### Policy

Maxim will identify, segregate as much as feasible, hold, disposition nonconforming products and execute action as necessary for proper release/shipment of good products.

### Description

1. All nonconforming products at incoming inspection will be identified as nonconforming products using DMRs or equivalent documents.
2. All nonconforming products during in process and final inspections will be identified as nonconforming products in the inspection status of the traveler as a minimum
3. All nonconforming products from returns will be identified as nonconforming using RMA or equivalent document..
4. All nonconforming products will be put on hold and segregated as much as possible and/or properly identified until evidence of disposition is available.
5. All nonconforming materials will be dispositioned as defined in the applicable specification. Disposition document will be attached to the nonconforming material documentation.
6. All actions done to the nonconforming material should be based on applicable instructions. This includes rework that needs to follow work instructions.
7. No nonconforming materials can be moved to the operation flow without proper release/authorization for processing and/or shipment.
8. Dispositions as scrap should be executed as early as possible to avoid mixing with good parts.
9. Parts not meeting specifications may be submitted for customer waiver upon approval by QA management. Only a customer approved waiver can be used as reference for release of this part.
10. Nonconforming materials may be analyzed if the cause for nonconformity has not been determined. Part/samples will be given to Failure Analysis in this case.
11. Corrective action will be issued if the failure analysis shows the need for it.
12. Containment actions will be initiated as and when necessary.
13. Suspect products should be included in the classification of nonconforming products and will be subjected to all actions listed in the applicable procedure


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## Detailed Requirements

### Standards:

### Maxim specifications:

03-10-0016	Discrepant Material Report Procedure
10-0041	Module Assembly DMR Issuance Procedure
10-0043	General IQC Piece parts Procedure
10-0045	QA Electrical System Test Requirements
10-0053	Control of Nonconforming Parts/Procedure
10-0062	Reject Tag Procedure
10-0065	MRB Procedure
10-0132	DMR Procedure
10-0535	Material Review Process
10-3296	Disposition of Nonconforming Materials, MAXFAB
18-0687	Module Assembly Discrepant Material Report Form
18-0892	Control of Nonconforming Parts Report
18-4445	Discrepant Material Report
75-0004	Material Disposition Guidelines for Maxim

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# 31. Process Control

## Policy

All manufacturing and related operations will run in controlled conditions. Inspection criteria and work instructions should be documented prior to the start of operation and updated as needed. Human resources, bill of materials, equipments and measurement equipments should be provided for by management. Product release, delivery and post delivery activities should be defined and implemented.

## Description

1. Maxim shall plan and carry out production and service provision under controlled conditions. This includes provision and implementation of the following as applicable:
  - Materials
  - Machines
  - Manpower
  - Methods
  - Environment
2. Maxim shall develop and implement process flows, process FMEAs and control plans for all automotive operations as minimum. Creation of process FMEAs and control plans will take into consideration design records if and when applicable.
3. Maxim shall subscribe to AIAG Measurement System Analysis for new equipments and GR&R for legacy equipments. Limits implemented can be % GR&R or the ration of %GR&R to process tolerance depending on operation.
4. Maxim shall monitor process data and conduct analysis of those data for continuous improvement of operations. This includes SPC data
5. Operation specifications should be updated as needed through Document Control. Any updates should be linked to other related documents such as control plans and process FMEAs,
6. Operation personnel should be trained per the provision of the training section of this manual.
7. All machines and equipment should be subjected to either/or/combination of calibration, preventive maintenance and MSA/GR&R as defined in the applicable procedure. In addition predictive maintenance should be implemented as a tool for efficient management of equipments and operations.
8. Maxim shall prepare documented work instructions for all operations that impact product quality. Instructions shall be accessible in the working area for use as and when needed. These instructions should be based from quality plan, control plan and design provisions.
9. Job set-ups should be done as defined in the applicable procedure and is subject to verification.
10. Human, space and tools resources should be provided for by management for efficient flow of operations.
11. Outsourced activities, if any should be controlled, verified and monitored as defined in established procedures
12. Operations scheduling should be order driven and should support continuous improvement system like JIT, Lean manufacturing if and when feasible and applicable.
13. Special processes are monitored just like regular processes with complete provisions of process element like material, machines, methods, manpower and environment.


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## Detailed Requirements

### Standards:

### Maxim Specifications

03-XXXX	Wafer Fab Operations Procedures
04-XXXX	Wafer Sort Operations Procedures
08-XXXX	Training specs
11-0036	Tooling File Procedures
11-0037	ECN Procedure for Changes to BOMs in MAXCIM
11-0128	Document Control Procedure
44-XXXX	Operations Process Flows/Control Plans
77-XXXX	Operations FMEAs
77-0008	Measurement Systems Analysis
78-0002	PFMEA Procedure
78-0066	DFMEA Procedure
XX-XXXX	Test Operations Procedure
XX-XXXX	Calibration Procedure
XX-XXXX	Preventive Maintenance Procedures

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## 32. Analysis of Data

### Policy

Maxim will collect and analyze appropriate data from each department and its activities to demonstrate the suitability and effectiveness of the QMS and for continuous improvement purposes.

### Description

1. Each department as appropriate will define performance metrics and corresponding goals for monitoring and trending for continuous improvement. This will include among other information about customer satisfaction, conformity to product requirements, characteristics and trends of processes and products including opportunities for preventive action and suppliers information.
2. Analysis and reporting of such data will be done at regular interval and as often as needed. The report will show performance to goals. These data will be closely tied up to the management by objective implemented in Maxim as well as the quarterly performance review by department and by exempt employees..
3. The data analysis supports the objectives for development of priorities for prompt solutions of customer issues, supports all relevant decision making, supports long term planning activities and supports timely reporting to top management.
4. Metrics may be benchmarked with other companies for improvement and desire for competitive edge.

### Detailed Requirements

#### Standards:

#### Maxim requirements


Performance metrics per department

Performance trending per department

Goals and objectives per department

Performance report per department

Corrective actions relative to performance metrics not meeting goals, if any

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## Glossary of Terms

**Accept Number.** The largest number of defective devices in a sample that will permit acceptance of the lot.

**Advanced Product Quality Planning (APQP).** Advanced Product Quality Planning (APQP) is a quality framework used for developing new products in the automotive industry. The APQP process is described in the AIAG. Its purpose is "to produce a product quality plan which will support development of a product or service that will satisfy the customer." It does this by focusing on:

- Up-front quality planning
- Evaluating the output to determine if customers are satisfied & support continual improvement

The Advanced Product Quality Planning process consists of five major activities along with ongoing feedback assessment and corrective action as shown below.

Phase 1 - Plan and Define Program - determining customer needs, requirements and expectations using tools such as QFD. Review the entire quality planning process to enable the implementation of a quality program and how to define and set the inputs and the outputs.

Phase 2 - Product Design and Development - review the inputs and execute the outputs, which include FMEA, DFMEA, design verification, design reviews, material & engineering specifications.

Phase 3 - Process Design & Development - addressing features for developing manufacturing systems & related control plans. These tasks are dependent on the successful completion of phases 1 and 2 to execute the outputs.

Phase 4 - Product & Process Validation - validation of the selected manufacturing process and its control mechanisms through production run evaluation outlining mandatory production conditions and requirements identifying the required outputs.

Phase 5 - Launch, Feedback, Assessment & Corrective Action - focuses on reduced variation & continuous improvement, identifying outputs & links to customer expectations & future product programs.

**Automotive Industry Action Group (AIAG).** A not-for-profit association, AIAG's primary goals are to reduce cost and complexity within the automotive supply chain and to improve speed-to-market, product quality, employee health-and-safety and the environment


**Automotive Electronics Council (AEC).** The AEC was originally established by Chrysler, Ford, and GM for the purpose of establishing common part-qualification and quality-system standards. From its inception, the AEC has consisted of two Committees: the Quality Systems Committee and the Component Technical Committee. Today, the committees are composed of representatives from the sustaining members Delphi Corporation, Siemens VDO Corporation and Visteon Corporation, and other associate members.

**Ambient Temperature.** The surrounding temperature, 25 +3/-5 C, unless otherwise specified.

**AQL.** Acceptable Quality Level is the lot percent defective that would be accepted 95% of the time by sampling.

**Certificate of Design, Construction, and Qualification (CDCQ).** Common format for submitting fab, assembly, material, and test data to automotive customers. Normally prescribed in PPAP submissions. Also see production part approval process (PPAP).

**Control Plan.** The intent of a process control plan is to control the product characteristics and the associated process variables to ensure capability (around the identified target or nominal) and stability of the product over time.

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**Design Failure Modes and Effect Analysis (DFMEA).** The Design Failure Modes and Effects Analysis (DFMEA) is a document to identify the risks associated with something potentially going wrong (creating a defect - out of specification) with the design of the product. Also see Failure Modes and Effect Analysis (FMEA).

**Date Code.** A system of symbols usually marked on the product by the supplier to identify a time of manufacture, or marking for the purpose of traceability.

**Device Type.** An individual, distinguishable, and uniquely identified semiconductor having specific characteristics and ratings.

**Discrepancy.** Any deviation from the requirements specified for the product, process, or procedure.

**Discrete Device.** Any of the following devices: diode, transistor, light emitting diode. In general, a discrete device has three (3) or fewer leads per package.

**DPA.** Destructive Physical Analysis for the purpose of analyzing the construction of the device.

**ECGBD.** Electrical Characterization Guaranteed By Design

**ECN.** Engineering Change Notice used to document all changes through the Document Control Systems.

**End Point Tests.** A test or series of tests that are performed at the conclusion of a series of stress tests.

**Failure Criterion.** The standard or value against which a device exhibits its inability to perform its required function.

**Failure Mode.** The characteristics of the failure including, when appropriate, the specific operation or test existing at the time of failure.

**Failure Rate.** Failure rates per unit of time, such as % failures per thousand hours.

**FIT.** Failure In Time. The number of failures per billion device hours.

**Failure Modes and Effects Analysis (FMEA).** The process Failure Modes and Effects Analysis (FMEA) is a document to identify the risks associated with something potentially going wrong (creating a defect - out of specification) in the production of the product. The FMEA identifies what controls are placed in the production process to catch any defects at various stages on the processing. The FMEA is also used to rank & prioritize the possible causes of failures as well as develop and implement preventative actions, with responsible persons assigned to carry out these actions. Also see Design Failure Modes and Effects Analysis (DFMEA), and Process Failure Modes and Effects Analysis (PFMEA)

**Functional Test.** A go/no-go test that sequentially exercises a function (truth) table. Functional testing for discrete devices is defined as being OPEN/SHORT test.


**Hermetic.** A device that is sealed within a cavity that is impervious to external surroundings, such as air, water, gas, etc.

**Gauge Repeatability & Reproducibility (GR&R).** GR&R is a concept to insure stable measurements where a single person gets the exact same results each and every time they measure and/or collect data measurements. See repeatability, and see reproducibility.

**Hybrid Device.** A microcircuit that combines more than one monolithic element.

**Incoming Inspection.** The examination of a product after it has been initially received from a supplier, but prior to the product being placed into inventory or forwarded to area of usage.

**Inspection Lot.** A specific quantity of one device type offered for inspection and acceptance at one time.

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**Integrated Circuits.** Multi-junction semiconductors with separately specified inputs or outputs. Hybrid circuits are considered as part of this category.

**Intermittent/Open Lead Test.** A measure of DC continuity of semiconductor internal leads over a specified temperature range.

**Life Test.** An accelerated stress test or series of stress tests to determine the probable failure rate of a semiconductor device in actual operation.

**LTPD.** Lot Tolerance Percent Defective is the lot percent defective that would be accepted 10% of the time by sampling.

**Major Change.** A change in any physical or electrical characteristic or process that may result in failure or materially change the usability or reliability of the item for its intended purpose.


**Maximum Rating.** Specified values of electrical and environmental conditions that are not to be exceeded under any service or test conditions.

**Measurement Systems Analysis (MSA).** Methods to analyze the effect of the measurement system on the measured value. Emphasis is on the effect due to equipment and personnel. Also Gauge (Gage) repeatability and reproducibility (GR&R).

**Parametric Test.** A test to assure that the measured value of a characteristic is within limits specified for that particular characteristic.

**Part Submission Warrant (PSW).** A procedure by which the supplier gives evidence to the customer that he is able to satisfy the requirements of Delivery date, Quality, Process Capability and Production Rate.

**Process Failure Modes and Effect Analysis (PFMEA).** The Process Failure Modes and Effects Analysis (PFMEA) is a document to identify the risks associated with something potentially going wrong (creating a defect - out of specification) with the processing or production of the product. Also see Failure Modes and Effect Analysis (FMEA).


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**Production Part Approval Process (PPAP).** The Production Part Approval Process (PPAP) outlines the methods used for approval of production, up to and including part submission warrant (PSW) in the Advanced Quality Planning (APQP) process. The purpose of the PPAP process is to ensure that suppliers of components comply with the design specification and can run consistently without affecting the customer line and improving the quality systems. PPAP ensures that you will achieve the first time quality and will lower the cost of quality.

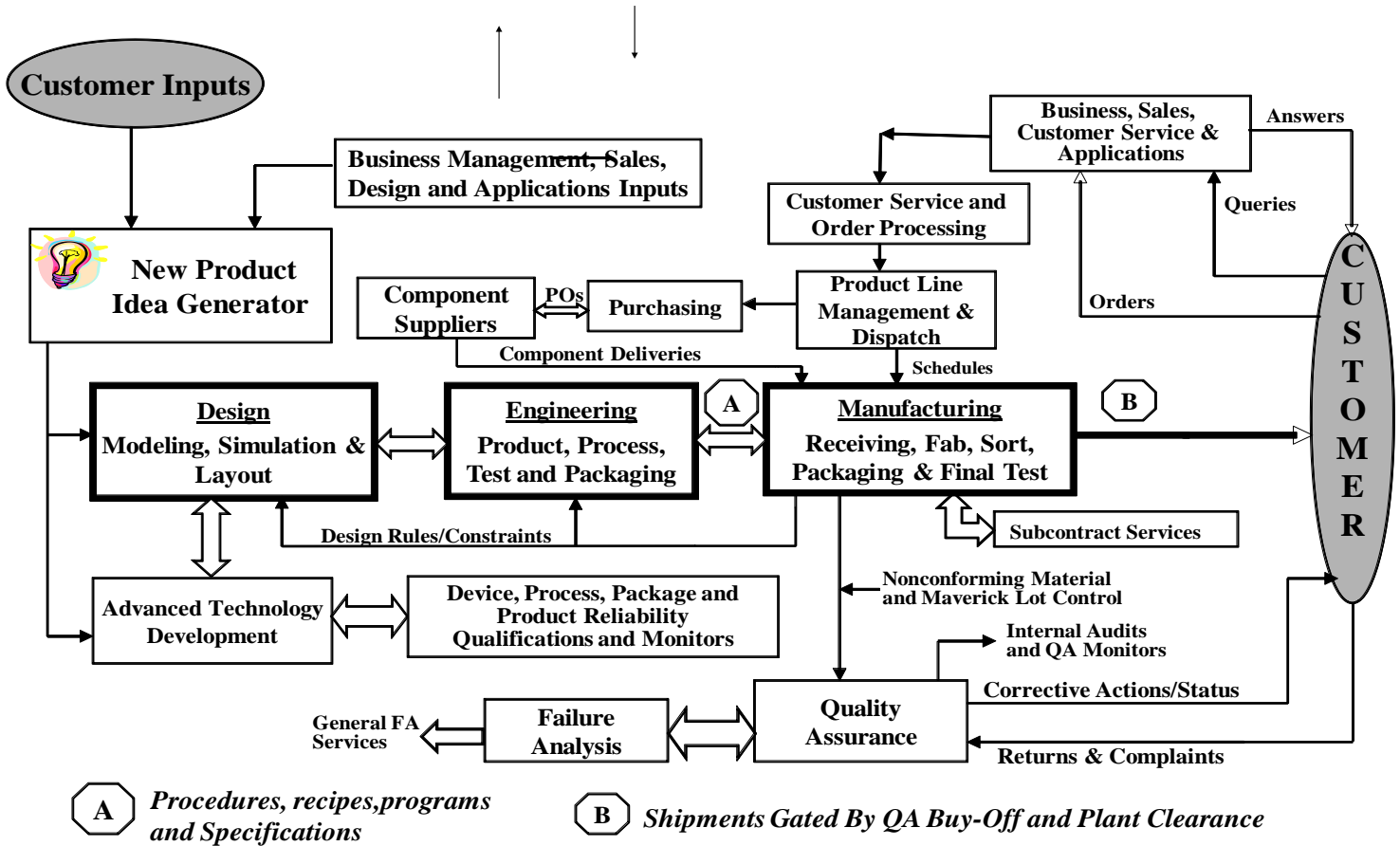
**Repeatability.** Variations in measurements obtained with *one measurement instrument* when used several times by *one assessor* while measuring identical characteristic on *the same part*. Also see gage repeatability and reproducibility (GR&R).

**Repeatability & Reproducibility (R&R).** See gauge repeatability and reproducibility (GR&R)

**Reproducibility.** Variation in the average of measurements made by *different assessors* using the *same measuring instrument* when measuring the identical characteristic on the *same part*. Also see gauge repeatability and reproducibility (GR&R).

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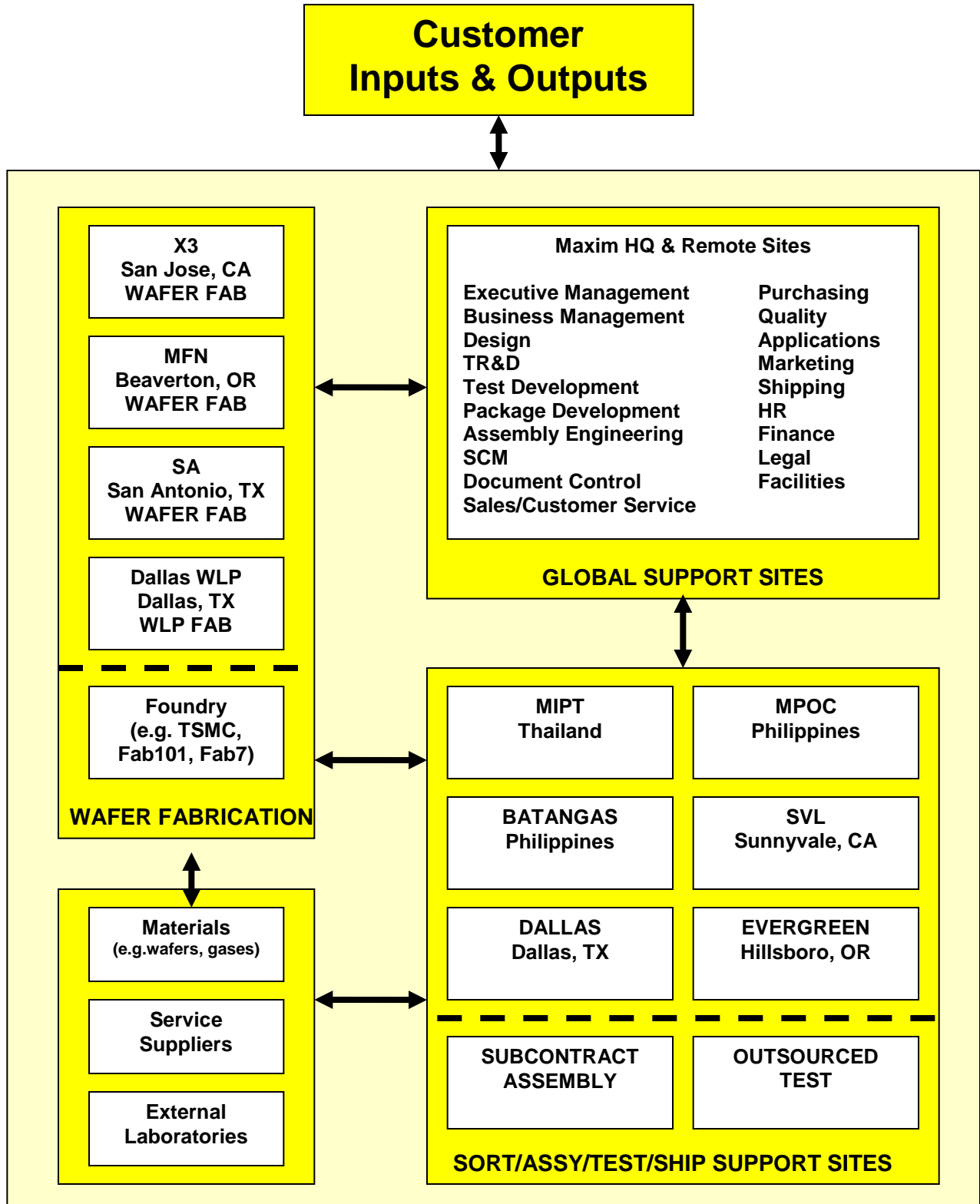
## Attachment A: General Processes of the Maxim Quality Management System



**A** *Procedures, recipes, programs and Specifications*

**B** *Shipments Gated By QA Buy-Off and Plant Clearance*

# Attachment B: Manufacturing Sites & Support Interfaces



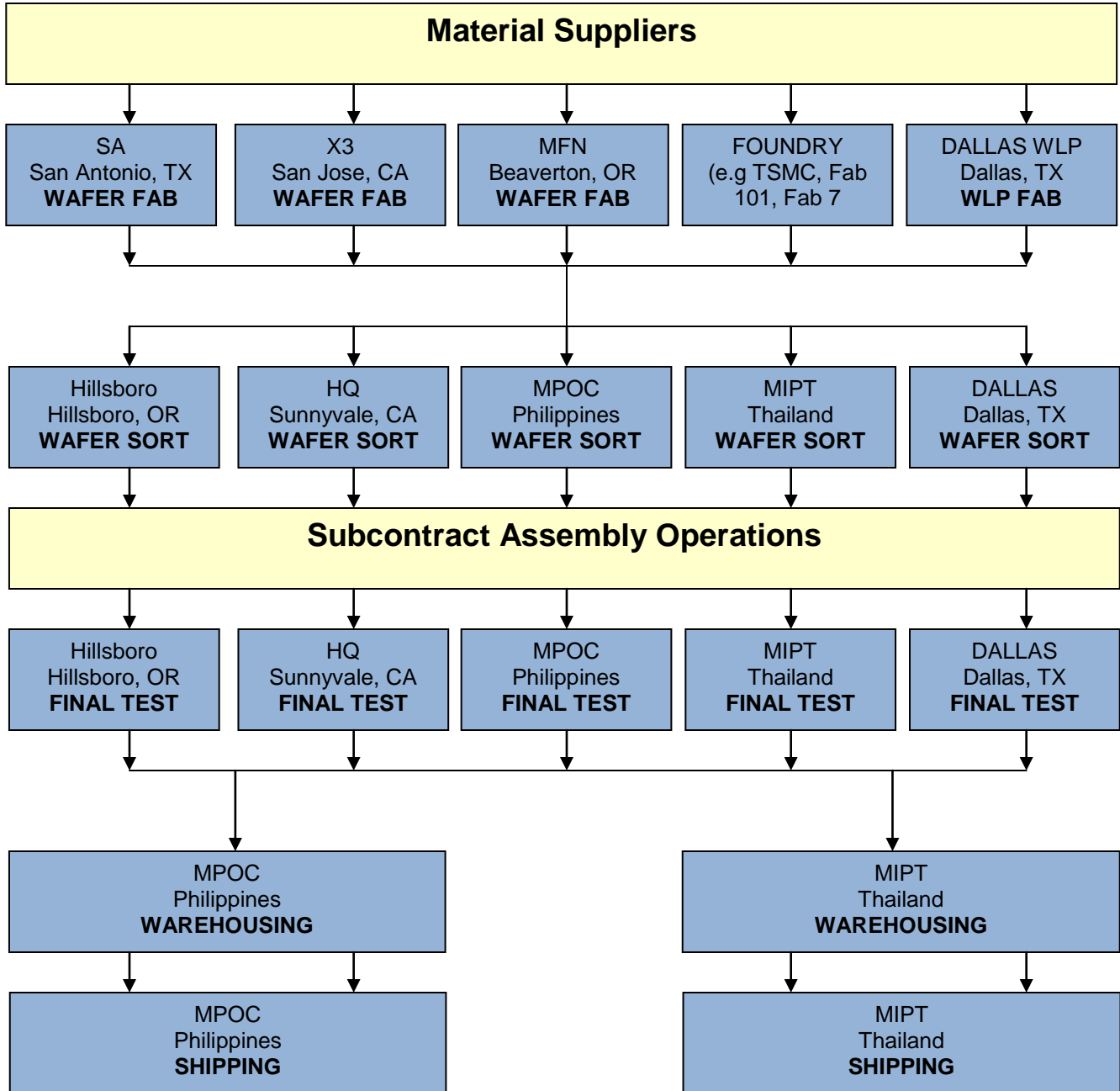
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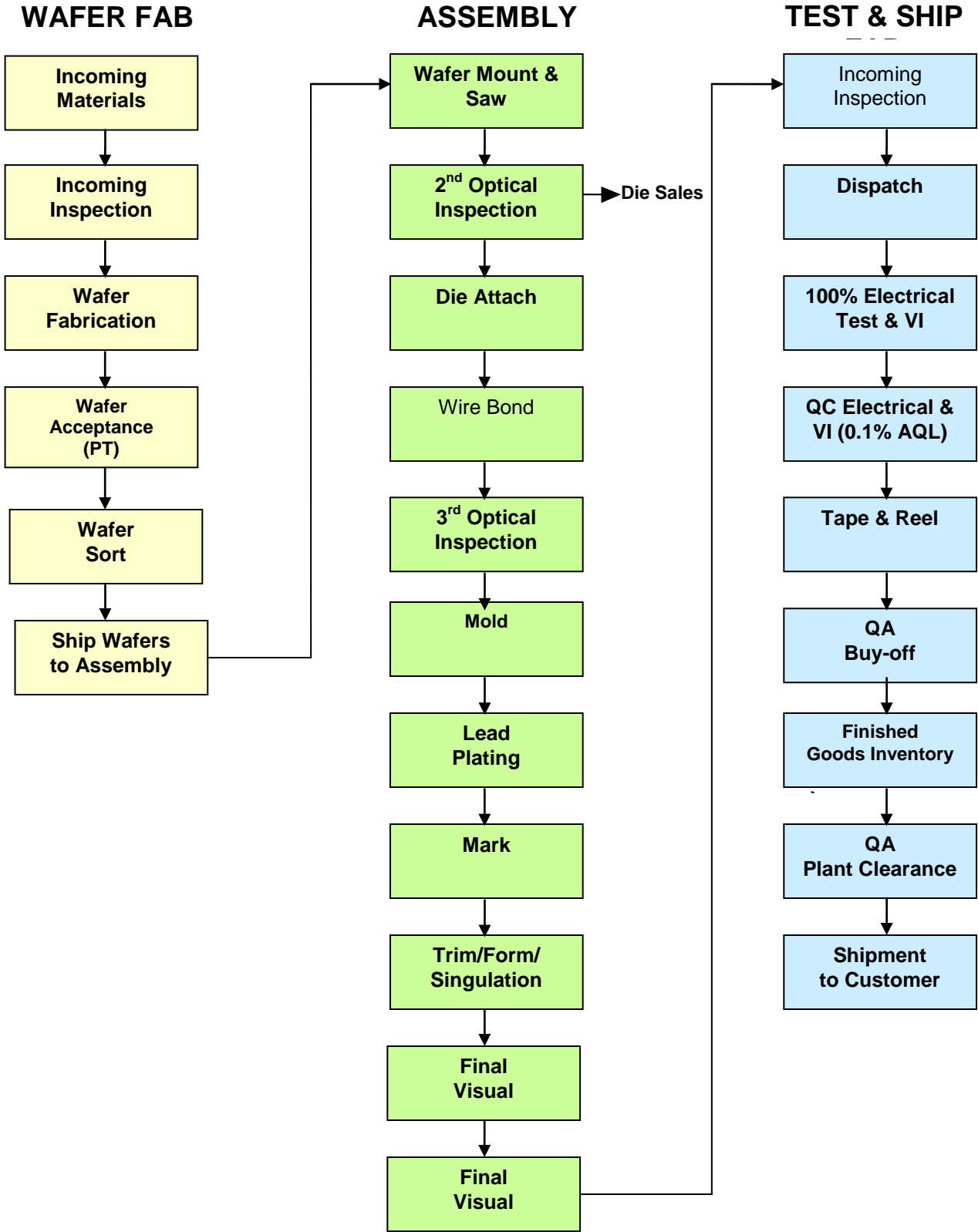
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# Attachment C: Maxim High Level Manufacturing Process Flow



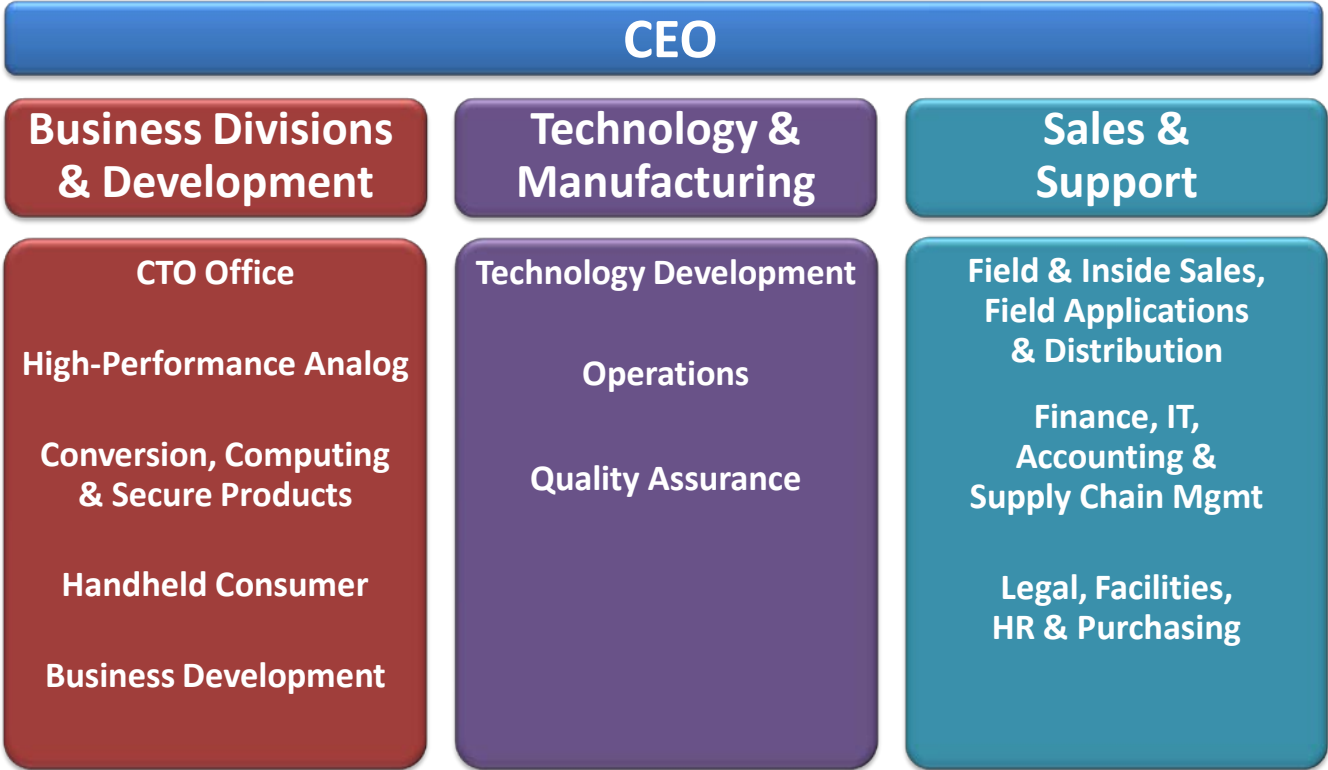
# Attachment D: Product Flow



# Attachment E




## Company Organization

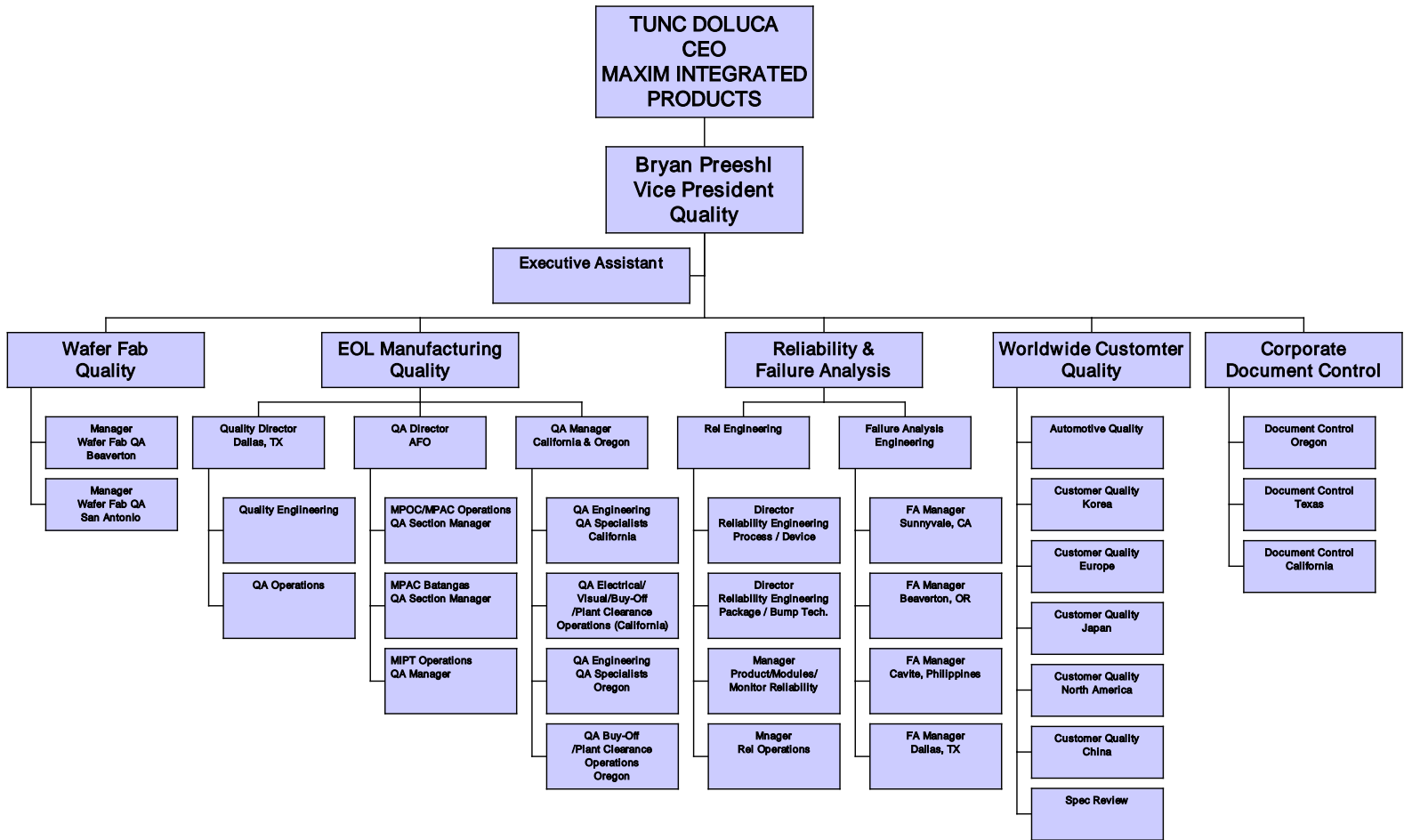



[ x ] = Tenure at Maxim in years.



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# Attachment F: Maxim QA Organization Reporting Structure



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## ATTACHMENT G: CROSS REFERENCE ISO9001:2008/TS16949 TO MAXIM'S QUALITY MANUAL

ISO9001:2008 / TS16949:2009		Maxim Quality Manual (10-0137)		Key Maxim Procedure(s)
Section/Title	Page	Section/Title/Paragraph	Page	
<b>4 Quality Management System</b>				
<b>4.1 General requirements</b>	4	<b>2.0 Product assurance program</b>	6	10-0137
4.1.1 General Requirements – Supplemental	4	15.0 Control of vendors and procured items	23	10-0137
<b>4.2 Documentation Requirements</b>				
4.2.1 General	5	18.0 Document and data control system	27	10-0137 + Tier 2 Documents
4.2.2 Quality manual	5	Quality manual	all	10-0137
4.2.3 Control of documents	6	18.0 Document and data control system	27	11-0128, 10-0022
4.2.3.1 Engineering Specifications	6	18.0 Document and data control system	27	
4.2.4 Control of records	6	8.0 Records and record retention	13	10-0007
4.2.4.1 Records Retention	7	8.0 Records and record retention	13	10-0007
<b>5 Management Responsibility</b>				
<b>5.1 Management commitment</b>				
5.1.1 Process efficiency	7	31.0 Process control	43	03-XXXX, 04-XXXX
5.2 Customer focus	7	6.0 Customer communication and satisfaction	11	10-0137
5.3 Quality policy	7	Quality policy	3	10-0137
<b>5.4 Planning</b>				
5.4.1 Planning/Quality objectives	8	2.0 (6) Product Assurance Program	6	10-0137
		4.0 Quality objectives and continual improvement	9	10-0137
5.4.1.1 Quality Objectives - Supplemental	8	4.0 Quality objectives and continual improvement	9	10-0137
5.4.2 Quality management system planning	8	2.0 (E) Product assurance program	6	10-0137
		3.0 Organization	7	10-0137
<b>5.5 Responsibility, authority and communications</b>				
5.5.1 Responsibility and authority	8	2.0 Product assurance program	6	10-0006, 10-3006
		3.0 Organization	7	75-0001, 10-0137
5.5.1.1 Responsibility for quality	8	3.0 Organization	7	10-0006
5.5.2 Management representative	9	3.0 (G) Organization	7	10-0137
5.5.2.1 Customer Representative	9	3.0 Organization	7	10-0137
5.5.3 Internal Communication	9	3.0 Organization	7	10-0137
<b>5.6 Management Review</b>				
5.6.1 General	9	2.0 (5) Product assurance program	6	10-0137
		11.0 (9) Internal quality audits	18	10-3232
5.6.1.1 Quality management system performance	10	2.0 Product assurance program	6	10-0137
5.6.2 Review input	10	2.0 (5) Product assurance program	6	10-0137
		11.0 (9) Internal quality audits	18	10-3232
5.6.2.1 Review input – Supplemental	10	2.0 Product assurance program	6	10-0137


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5.6.3 Review output	10	2.0 (5) Product assurance program	6	10-0137
		11.0 (9) Internal quality audits	18	10-3232
<b>6 Resource Management</b>				
6.1 Provision of resources	11	3.0 (H) Organization, and Attachment A	7, 50	10-0137
<b><u>6.2 Human Resources</u></b>				
6.2.1 General	11	9.0 Personnel training	15	08-0131
6.2.1 General	11	8.0 (2A Training) Records and record retention	15	10-0137
		9.0 Personnel training	15	08-0131, 08-3993, 03-08-0081,03-08-0166
6.2.2 Competence, awareness and training	11	9.0 Personnel training	15	08-0131
6.2.2.1 Product design skills	11	24.0 (7) Design and development planning	33	99-0009
6.2.2.2 Training	12	9.0 Personnel Training	15	08-0131, 08-0124,03-08-0166, 08-2001, 08-4736, 08-7356, 08-0401, 08-4039, 08-4040
6.2.2.3 Training on the job	12	9.0 (3) Personnel Training	15	08-0131, 08-0124, 03-08-0166, 08-2001, 08-4736
6.2.2.4 Employee motivation and empowerment	12	4.0 Quality objectives and continual improvement	9	10-0137
<b><u>6.3 Infrastructure</u></b>				
6.3 Infrastructure	12	21.0 Failure analysis	31	10-0154
		22.0 Environmental controls	32	04-7027, 09-7001, 10-3589, 10-2228, 16-0011
6.3.1 Plant, facility and equipment planning	12	3.0 (11) Organization	7	10-0137
6.3.2 Contingency plans	12	3.0 (13) Organization	7	10-0137
<b><u>6.4 Work Environment</u></b>				
6.4 Work environment	13	22.0 Environmental controls	7	04-7027, 09-7001,10-3589, 10-2228, 16-0011,
6.4.1 Personnel safety to achieve conformity to product requirements	13	3.0 (13) Organization	7	10-0137
6.4.2 Cleanliness of premises	13	22.0 Environmental controls	7	10-0137, 03-2015, 03-4779, 03-703410-2228
<b>7 Product realization</b>				
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7.1.1 Planning of product realization - supplemental	14	23.0 Product and process realization	33	10-0137, 51-0004, 52-0004, 52-7001, 17-7001
7.1.2 Acceptance criteria	14	23.0 Product and process realization	33	51-0004, 52-0004, 10-3006
7.1.3 Confidentiality	14	5.0 Specification review system	10	71-0001
7.1.4 Change Control	14	18.0 Document and data control system	27	11-0128
<b><u>7.2 Customer-related processes</u></b>				

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7.2..2.1 Customer-designated special characteristics	15	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.2.2 Review of requirements related to the product	15	5.0 Specification review system	10	10-0109
7.2.2.1 Review of requirements related to the product - supplemental	15	15.0 Control of vendors and procured items	23	02-0031
7.2.2.2 Organization manufacturing feasibility	15	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.2.3 Customer communication	16	3.0 (B Open lines of communication...) Organization	7	10-0137
		6.0 Customer communication and satisfaction	7	10-0137
		16.0 Customer returns analysis procedure	25	10-0115
		19.0 (3) Corrective and preventive action system	28	10-0005
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<b>7.3 Design and development planning</b>				
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7.3.1.1 Multidisciplinary approach	16	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.3.2 Design and development inputs	17	24.0 Design and development planning	34	51-0004, 17-7001
7.3.2.1 Product design input	17	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.3.2.2 Manufacturing process design input	17	24.0 Design and development planning	34	52-0004, 78-0143
7.3.2.3 Special characteristics	17	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.3.3 Design and development outputs	18	24.0 Design and development planning	34	51-0004, 17-7001
7.3.3.1 Product design outputs – supplemental	18	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
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7.3.4 Design and development review	19	24.0 Design and development planning	34	51-0004, 17-7001
7.3.4.1 Monitoring	19	24.0 Design and development planning	34	51-0004, 17-0001, 78-0143
7.3.5 Design and development verification	19	24.0 Design and development planning	34	51-0004, 17-7001
7.3.6 Design and development validation	19	24.0 Design and development planning	34	51-0004, 17-7001
7.3.6.1 Design and development validation - supplemental	19	24.0 Design and development planning	34	51-0004, 17-7001
7.3.6.2 Prototype programme	20	24.0 Design and development planning	34	51-0004, 17-7001
7.3.6.3 Product approval process	20	24.0 Design and development planning	34	51-0004, 17-7001, 99-0005
7.3.7 Control of design and development changes	20	24.0 Design and development planning	34	51-0004, 17-7001
<b>7.4 Purchasing</b>				
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7.4.1.1 Statutory and regulatory conformity	21	15.0 Control of vendors and procured items	23	10-2515, 10-2517, 02-0031

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7.4.1.2 Supplier quality management system development	21	15.0 Control of vendors and procured items	23	10-2515, 10-2517, 02-0031
7.4.1.3 Customer-approved sources	21	15.0 Control of vendors and procured items	23	10-2515, 10-2517, 02-0031
7.4.2 Purchasing information	21	15.0 Control of vendors and procured items	23	02-3440, 62-0030
7.4.3 Verification of purchased product	21	15.0 Control of vendors and procured items	23	10-2778
7.4.3.1 Incoming product conformity requirements	22	15.0 Control of vendors and procured items	23	10-2515, 10-2517, 02-0031
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		18.0 Document and data control system	27	11-0128
		27.0 Statistical techniques	39	10-0009
7.5.1(f) Control of production and service provision	22	13.0 Final outgoing inspection, packaging and shipping	21	10-0113, 07-7231
7.5.1.1 Control Plan	22	31.0 Process control	43	11-0137, 144-XXXX, 78-XXXX
7.5.1.2 Work Instructions	23	31.0 Process control	43	11-0137, 03-XXXX, 78-XXXX
7.5.1.3 Verification of job set-ups	23	31.0 Process control	43	11-0137, 03-XXXX, 78-XXXX
7.5.1.4 Preventive and predictive maintenance	23	10-0 Equipment maintenance and calibration	16	11-0137, 16-XXXX
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7.5.1.6 Production scheduling	24	31.0 Process control	43	11-0137
7.5.1.7 Feedback of information from service	24	16.0 Customer Returns Analysis Procedure	25	11-0137, 10-0115
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7.6.2 Calibration/verification records	27	8.0 Records and record retention	13	10-0137, 10-0007
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7.6.3.1 Internal laboratory	27	29.0 Laboratory requirements	40	10-0009, 55-0020, 56-0019
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		11.0 Internal quality audits	18	10-3232
8.2.2.1 Quality management system audit	29	11.0 Internal quality audits	18	10-3232
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8.2.3 Monitoring and measurement of processes	31	27.0 Statistical techniques	39	10-0009
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		12.0 (3 Inspection and test status...) Material handling preservation and storage	19	10-0137
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8.3.3 Customer information	32	30-0 Control of nonconforming product	41	11-0137
8.3.4 Customer waiver	32	30-0 Control of nonconforming product	41	11-0137
<b><u>8.4 Analysis of data</u></b>				
8.4.1 Analysis and use of data	33	32.0 Analysis of data	45	11-0137
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8.5.2 Corrective action	34	19.0 Corrective and preventive action system	28	10-0005, 10-0154
8.5.2.1 Problem Solving	34	19.0 Corrective and preventive action system	28	10-0005, 10-0154
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8.5.2.4 Rejected product test/analysis	34	16.0 Customer returns analysis procedure, 21.0 Failure analysis	25	10-0115, 56-0018
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A	No ECN #: Initial Release	11-19-85	?
B	ECN 1007: Re-written	07-13-88	KH
C	ECN 8203: CANCELED	07-09-90	JR
D	ECN C1736: Update and include ISO9001 references	03-26-93	JH/JW
E	ECN C4739: Change quality policy, update references.	07-16-93	JH
F	A0806: Delete the word "nackmark" in Section 5.0, Page 13. Use "traceability" instead. More accurate for Maxim North. Need to add selected Maxim-North spec references.	09-01-94	JM
G	ECN D6312: Incorporate clarifications and additions.	06-14-95	BP
H	MFN-98-3014: Reflect changes made in support documents as listed below. Concurrent change made in document ID # 10-2778 (Incoming Inspection System for Critical Materials). Discrepant material is identified by DMR, not MRB.	Canceled Canceled	BW BW
I	ECN HQ-01-2829. Reflect new procedure that audits may or may not use checklists. Discrepant material is identified by DMR, not MRB.	02/14/03	CL
J	ECN X3-02-0556. Updated to current practices (not updated for over 7 years). Eliminate redundant or obsolete Maxim North documents. Corrected titles of some documents. Eliminated all organization charts except for Quality Organization.	02/17/03	JM/AQ/ AS
K	ECN X3-03-0074. Updates to comply with the year 2000 revision of ISO 9001.	02/24/03	JM/AQ/ AS
L	ECN X3-03-0088. Updates to comply with the year 2000 revision of ISO 9001.	CANCELLED	JM/AQ/ AS
M	ECN PH-04-0166. To add Maxim Thailand in the specs coverage.	12-21-05	AS
N	<i>ECN HQ-04-B700. Include San Antonio specifications as a reference. Document Control, DVC 12-3-04: All Maxim Facilities use this specification; adding Maxim Facilities not called out in previous revision. Including updates to comply with ISO/TS16949:2002, and general automotive requirements</i>	04-01-06	CL/GT/TT
O	ECN#EV-06-3449: : Correct typo errors from previous revisions. Incorporate provisions in response to TS16949:2002 X3 Readiness Review Findings and X3, HQ, MPOC, MPIT, Brighton Certification Audit Findings. Update the interphase charts. Correct paging errors.	04-02-07	GT
P	ECN#EV-10-2516: To update the quality assurance manual to the new military document changes and ISO/TS16949 upgrades	01/12/11	GT

## Rev "P" CHANGES

**Note: The following list is meant to be used a reference only. Final changes are reflected in the actual documented and may not be listed below. (B.Preeshl 1/05/2011)**

FROM	TO			
<b>Document # 10-0137 Rev N</b>	<b>Document #10-0137 Rev P</b>			
Introduction	Replaced by new CEO Introduction.			
Table of Contents	Changed according to new page numbers			
<b>1.0 Applicable Documents</b>	<b>1.0 Applicable Documents</b>  Arranged according to Alpha-numeric order of standard name, deleted Mil-STD-105, Added Mil-M-38510, Mil-PRF-19500, Mil-PRF-38535 and Mil-STD 45662			
<b>2.0 Product Assurance Program</b> 1. The Product Assurance Program is developed, administered and maintained by the Quality Assurance and Reliability Department, with the assistance of other organizations intertwined within the fabric of this program. Personnel working within this department have been given sufficient responsibility, authority and organizational freedom to identify, contain, evaluate, recommend and initiate corrective actions to quality problems. This license is granted and empowered by the authority of the company President.  2. The Product Assurance Program is structured to comply with the applicable portions of the specifications listed in Section 1\0.  3. Major and significant changes to this Product Assurance Program require the approval of the President and applicable members of his staff.  A. Commercial Class: These products are held to and comply with the basic commercial practice quality requirements, such as JEDEC/EIA standards. They are also held to MTTF and Failure In Time (FIT) limits, process screening requirements and qualification as specified in Maxim's current data book and published in the Maxim website.  B. Military Class: These products are held to and comply with the quality requirements defined in MIL-STD-883,	<b>2.0 Product Assurance Program</b> 1. The Product Assurance Program is developed, administered and maintained by the Quality Assurance and Reliability Department, with the assistance of other organizations intertwined within the fabric of this program. Personnel working within this department have been given sufficient responsibility, authority and organizational freedom to identify, contain, evaluate, recommend and initiate corrective actions to quality problems. This license is granted and empowered by the authority of the company Chief Executive Officer (CEO)  2. The Product Assurance Program is structured to comply with the applicable portions of the specifications listed in Section 1.0.  3. Major and significant changes to this Product Assurance Program require the approval of the CEO and applicable members of his staff.  A. Commercial Class: These products are held to and comply with the basic commercial practice quality requirements, such as JEDEC/EIA standards. They are also held to MTTF and Failure In Time (FIT) limits, process screening requirements and qualification as specified in Maxim's current data book or equivalent and published in the Maxim website.  B. Military Class: These products are held to and comply with the quality requirements defined in MIL-STD-883,			
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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 33%;">DOCUMENT I.D. 10-0137</td> <td style="text-align: center; width: 33%;">REVISION P</td> <td style="text-align: center; width: 33%;">PAGE 63</td> </tr> </table>	DOCUMENT I.D. 10-0137	REVISION P	PAGE 63
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<p>Class B.</p> <p>5. Annual reviews of the Product Assurance Program will be held with Executive Management responsible for product quality. Records of such meetings will be maintained by Quality Management. This quality manual will be reviewed at least annually for any material changes that may be needed.</p> <p>Detailed Requirements.</p>	<p>Class B.</p> <p><b>NOTE: The letter B (/883B) of the device top mark stands for Military Class Level, and not for the MIL- STD-883 revision. Example: DG507AAK/883B</b></p> <p>5. Annual reviews of the Product Assurance Program will be held with Executive Management responsible for product quality. Records of such meetings/reviews will be maintained by Quality Management. This quality manual will be reviewed at least annually for any material changes that may be needed.</p> <p>Detailed Requirements: Added ISO9001 and ISO/TS16949 Deleted AIAG Manual on APQP.</p>
<p><b>3.0 Organization</b></p> <p>C. Maintain an effective inspection system that assures conformance of products and services to customer requirements. It is the responsibility of the Quality Assurance Organization to maintain all in-process monitors and to ensure that the data derived from such monitoring is reported to management in a timely manner.</p> <p>F. The QA &amp; R, the Manufacturing, and the Design organizations are empowered by the company President to halt production if significant deviations from accepted practice are discovered which could jeopardize the quality or reliability of the product or result in a noncompliance to required standards, such as customer contracts and international or military standards.</p> <p>H. The Quality Assurance Manager, or equivalent, implements the directed strategies into workable tactics. He is responsible for the identification of resource needs and for bringing them to the attention of Quality Management. He is also responsible for alerting Quality Management when discrepancies are found, when a need for a new program exists, or when implementation of a strategy becomes impractical.</p> <p>K. Facilities Manager and Maintenance Manager is responsible to coordinate multi-disciplinary approach for developing plant, facility and equipment plans and evaluating results.</p> <p>Detailed Requirements</p>	<p><b>3.0 Organization</b> – converted descriptions to numerical</p> <p>3. Maintain an effective inspection system that assures conformance of products and services to customer requirements. It is the responsibility of the Quality Assurance organization to maintain all in-process monitors and to ensure that the data derived from such monitoring is reported to management in a timely manner.</p> <p>6. The QA &amp; R, the Manufacturing, and the Design organizations are empowered by the company CEO to halt production if significant deviations from accepted practice are discovered which could jeopardize the quality or reliability of the product or result in a noncompliance to required standards, such as customer contracts and international or military standards</p> <p>8. Quality Assurance Managers, or equivalent, implement the directed strategies into workable tactics. The Quality Assurance Mangers are responsible for the identification of resource needs and for bringing them to the attention of Quality Management. They are also responsible for alerting Quality Management when discrepancies are found, when a need for a new program exists, or when implementation of a strategy becomes impractical.</p> <p>11. Facilities Managers and Maintenance Managers are responsible to coordinate multi-disciplinary approach for developing plant, facility and equipment plans and evaluating results.</p> <p>Detailed requirements: 10-3006 and Attachment E note</p>

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<p><b>4.0 Quality Objectives and Continual Improvement</b></p> <p>Policy</p> <p>Quality goals and objectives will be set for groups and individuals to ensure that we working in concert toward a common purpose which is consistent with the overall Maxim quality policy. Quality objectives support the Maxim quality policy by requiring continual improvements in the areas that provide the best opportunities for customer satisfaction and improved profitability.</p> <p>2 Quality objectives are specific recommendations for improvement of a product or a process (see Attachment A and C).</p> <p>6. Specific quality objectives and measurements, are established every quarter*, to support the overriding corporate level goals, will be set in one or more of the following general categories, considering the availability of resources and the need for improvements.</p> <p>* The Automotive Business plan includes quality goals and long-term planning for process changes and technology development i.e.</p>	<p><b>4.0 Quality Objectives and Continual Improvement</b></p> <p>Policy</p> <p>Quality goals and objectives will be set for departments, groups and individuals to ensure that the organization is working in concert toward a common purpose which is consistent with the overall Maxim quality policy. Quality objectives support the Maxim quality policy by requiring continual improvements in the areas that provide the best opportunities for customer satisfaction and improved profitability.</p> <p>2. Quality objectives are specific recommendations for improvement of a product or a process (see Attachment A and D).</p> <p>6. Specific quality objectives, established every quarter to support the overriding corporate levels goals, will be set in one or more of the following general categories, considering the availability of resources and the need for improvements.</p> <p>Deleted</p>
<p><b>5.0 Specification Review System</b></p> <p>Policy</p> <p>Customers routinely reflect their individual requirements of Maxim Product through the use of Source Control Drawing, Purchase Orders or Engineering Change Notices. These requirements shall be handled in a controlled fashion such that the said requirements are understood, translated and distributed to the appropriate personnel and implemented.</p> <p>Procedure</p> <p>1. Customers will routinely submit their requirements while soliciting Maxim for a Request for Quotation. These documents will be assigned a specific number and then will be distributed/submitted for review in a timely manner.</p>	<p><b>5.0 Specification Review System</b></p> <p>Policy</p> <p>Customers routinely reflect their individual requirements of Maxim product through the use of Source Control Drawings, Specifications. These requirements shall be handled in a controlled fashion such that the said requirements are understood, translated and distributed to the appropriate department and personnel and implemented.</p> <p>Procedure</p> <p>1. Customers submit their requirements in the form of general requirements, customer specific requirements and source control drawings. These requirements are routed to the Specification Review department which determine if a review is necessary and if so, assign a unique tracking number as appropriate. Specification Review will route the requirements for review in a timely manner. For automotive, timely review means</p>

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<p>2. Each reviewing department will evaluate the specific requirements pertinent to their efforts. They will then identify their capability to conform to these requirements, request further clarification of the requirements and detail what resources not presently available would be necessary to substantiate conformance.</p> <p>3. The Specification Review Manager consolidates all inputs into an easily decipherable explanation for approval and submission to Business Unit Management.</p> <p>4. Specification Review then develops a formal response. The formal response will contain Maxim's assessment of capability, costs to implement and estimated implementation time. A quotation will then be given with a projected delivery time, and if the product is deemed non-standard, a special ordering number will be given.</p> <p>5. After placement of a purchase order, the review is re-assessed by the Specification Review Manager. If there are any requests for waivers, Business Unit Management and Customer Service are notified and the order is placed on hold. Otherwise, the order is placed on backlog and the customer's requirements are re-assessed and work instructions are generated in order to facilitate the processing of the material through the factory. These work instructions then become controlled documents.</p> <p>6. Any changes made by the customer to these requirements will be evaluated in the same way as the initial review. Any changes required by Maxim will be summarized in notification sent to Business Unit Management. Customer Service will then send to the customer for notification. Material will not be processed until customer approval is given.</p>	<p>completion within maximum time frame of two (2) weeks.</p> <p>2. Each reviewing department will evaluate the specific requirements pertinent to their responsibility. They will then identify their capability to conform to these requirements, request further clarification of the requirements and detail what resources not presently available would be necessary to substantiate conformance.</p> <p>3. The specification review personnel consolidates all inputs into an easily decipherable explanation for approval and submission to appropriate parties (Business Unit Manager or Account Manager or Customer Quality Managers)</p> <p>4. Specification Review then develops a formal response. The formal response will contain Maxim's assessment of capability.</p> <p>5. The review is re-assessed by the Specification Review Manager. If there are any requests for waivers, it will be reflected in the response. Otherwise, the customer's requirements are re-assessed and work instructions are generated or incorporated in the current specifications in order to facilitate the processing of the material through the factory. Work instructions then become controlled documents. The effectivity date of this document is the effectivity date of the change.</p> <p>6. Any changes made by the customer to these requirements will be evaluated in the same way as the initial review. Any changes required by Maxim will be summarized in notification sent to appropriate personnel (Business Unit Manager, Account Manager and Customer Quality Manager). The appropriate manager will then send input to the customer for notification. Material will not be processed until customer approval is received.</p> <p>8. Specification Review archives all pertinent documents associated with the review</p>
Detailed Requirements	Detailed Requirements: Deleted 71-0002

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<p><b>6.0 Customer Communication and Satisfaction</b></p> <p>5. All customer requests for spec reviews will be handled using the formal spec review system described in the section 5.0 of this manual.</p> <p>7. The Customer Service department is chartered to handle all requests from customers regarding placement of orders, changes to orders, status of orders, delivery issues, or general queries for information.</p> <p>8. Data pertinent to customer satisfaction or dissatisfaction will be tracked and used as opportunities for continual improvement. Such data will form a part of the input to the Quality Management Review.</p> <p>Detailed requirements</p>	<p><b>6.0 Customer Communication and Satisfaction</b></p> <p>5. All customer requests for specification reviews will be handled using the formal specification review system described in the section 5.0 of this manual.</p> <p>7. The Customer Service department is chartered to handle all requests from customers regarding placement of orders, changes to orders, status of orders, delivery issues, delivered part quality performance, customer disruptions including returns, or general queries for information.</p> <p>8. Data pertinent to customer satisfaction or dissatisfaction will be tracked by the Customer Service and/or Customer Quality Department and used as opportunities for continual improvement. Such data will form a part of the input to the Quality Management Review. Departments/employees involved in customer satisfaction or dissatisfaction will be informed of details for proper corrective and preventive action.</p> <p>Detailed Requirements: Added 71-0001</p>
<p><b>7.0 Product Traceability</b> Detailed Requirements</p>	<p><b>7.0 Product Traceability</b> Detailed Requirements: Deleted 07-0110, 71-0002 Added, 71-0003,10-0125, 17-0552 and 11-0030</p>
<p><b>8.0 Records and Record Retention</b></p> <p>2. As a minimum the following records shall be maintained:</p>	<p><b>8.0 Records and Record Retention</b></p> <p>2. As a minimum the following records shall be maintained for the period specified in the record retention document # 10-0007</p> <p>9. <i>Added to paragraph 2</i></p> <p>L. Production Part Approval files for automotive devices.</p>

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Detailed Requirements	M. Management review records N. Supplier audit records O. Internal and external laboratory records P. Corrective and preventive action records Q. MRB and Nonconforming material records  Detailed requirements: Deleted 10-2100. Added 17-2009
<b>9.0 Personnel Training</b>  Policy  ..... The training certificates establishing proficiency shall be kept in the employee's permanent file.  All employees are considered to be qualified as a condition of and as a consequence of their being hired. Managers are responsible for identifying any additional training needed.  Procedure  1. Training Coordinators have the charter for providing centralized support for training and certification by: 3. The Training Coordinator's functions shall include:  B. Retesting or recertifying as required.  Detailed Requirements	<b>9.0 Personnel Training</b>  Policy  .....The training certificates establishing proficiency shall be kept in the employee's training or permanent file.  All other employees are considered to be qualified as a condition of and as a consequence of their being hired. Managers are responsible for identifying any additional training needs of their subordinates and keeping records of additional training completed. Employee evaluation form may be used for recording the training needs of employees.  Procedure  1. Manufacturing Training Coordinators have the charter for providing centralized support for training and certification by: 3. The Training Coordinator's functions shall include:  B. Retesting or recertifying as required including training related to new or changed documents/criteria.  E. Qualify/certify for new and modified jobs  Detailed requirements: Deleted 03-08-0081. Added 08-0124, 08-0208, 18-0793, 18-6081, 08-0349, 08-0414, 08-0401, 08-4039 and 08-4040
<b>10. Equipment Maintenance, Calibration and measurement System Analysis</b>  Policy  For Measurement System Analysis (MSA) requirements, Gage Repeatability and Reproducibility Studies (GR&R) are being used. For new technologies or equipment the full requirements of MSA will be considered for implementation.  2. Procedures for maintenance and calibration are to be written if the manufacturer's instructions are unclear, ambiguous, or not applicable to the environment in	<b>10. Equipment Maintenance, Calibration and Measurement System Analysis</b>  Policy  For Measurement System Analysis (MSA) requirements, Gage Repeatability and Reproducibility Studies (GR&R) are being used. For new technologies or equipment the full requirements of MSA will be implemented.  2. Procedures for maintenance and calibration are to be written if the manufacturer's instructions are unclear, ambiguous, or not applicable to the environment in

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<p>which the equipment is used. The procedures are to define the type of maintenance/calibration and frequency.</p> <p>Detailed Requirements</p>	<p>which the equipment is used. The procedures are to define the type of maintenance/calibration, standards to be used and frequency and acceptance criteria.</p> <p>3. Maxim shall utilize predictive maintenance methods, where applicable, to continually improve the effectiveness and the efficiency of production equipment.</p> <p>12. Section 29 of this manual lists the calibration laboratory manual provisions for both internal and external laboratories.</p> <p>13. Non-favorable calibration results will be handled according to general calibration procedure # 10-0155.</p> <p>14. Computer software used for monitoring and measurement of specified requirements shall be confirmed prior to initial use and at regular interval.</p> <p>15. All equipments listed in the control plan for measurement shall be subjected to MSA or GR&amp;R as per applicable procedures once and upon change or modification of the equipment.</p> <p>16. GR&amp;R acceptability can be by %GRR or by %GR&amp;R to Tolerance depending on purpose and coverage of measurement and as applicable.</p> <p>15, Employee owned equipment shall be subject to the provisions of calibration</p> <p>Detailed Requirements: Added 77-0008</p>
<p><b>11. Internal Quality Audits</b></p> <p>The QA &amp; R organization is also responsible for establishing and maintaining Quality Management System Audit, Manufacturing Process Audit and Product Audit</p> <p>2. The audits may consist of checklists and guidelines established and entered into document control. Checklists can be used as a tool to help perform the audit, but are not a requirement. These checklists are controlled documents and are revised in accordance with referenced standards.</p> <p>4. Corrective actions agreed upon after an audit will be</p>	<p><b>11. Internal Quality Audits</b></p> <p>The QA &amp; R organization is also responsible for establishing and maintaining Quality Management System Audit, Manufacturing Process Audit and Product Audit as applicable in each area to be audited.</p> <p>2. The audits shall consist of checklists and guidelines established and entered into document control. Checklists shall be used as a tool to help perform the audit. These checklists are controlled documents and are revised in accordance with referenced standards. In addition, result of previous audit should be added as emphasis to the audit.</p> <p>4. Corrective actions agreed upon after an audit will be</p>

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<p>verified in the subsequent audit.</p> <p>8. The completed audit will be filed and kept for a minimum of 5 years.</p> <p>9. Management will routinely review the quality systems based on the audits. Quality management at each site will issue monthly reports to Executive Quality Management on audit status, identifying commitments from each area, highlighting open action items, or commitments not forthcoming.</p> <p>Detailed Requirements</p>	<p>verified in the subsequent audit or sooner as deemed necessary by the auditor</p> <p>8. The completed audit will be filed and kept for a minimum period specified in document #10-0007</p> <p>9. Management will routinely review the quality systems based on the audits. Quality management at each site will issue quarterly reports to Executive Quality Management on audit status, identifying commitments from each area, highlighting open action items, or commitments not forthcoming.</p> <p>10. List of Internal Auditors are maintained by each facility and reported to HQ QMS Manager on a regular basis.</p> <p>Detailed Requirements: Added 10-0005, 10-0007</p>
<b>12. Material Handling, Preservation and Storage</b>	<b>12. Material Handling, Preservation and Storage</b>
<p>1. The company has no customer property in house but should there be in the future, it will be treated like Maxim's regular material, product and equipment and will be handled in accordance with applicable standard.</p> <p>Detailed Requirements</p>	<p>10. The company has no customer property in house but should there be in the future, it will be treated like Maxim's regular material, product and equipment and will be handled in accordance with applicable procedure</p> <p>11. The QA &amp; R in conjunction with Facilities and Legal Departments is responsible to see to it that all Quality Management System activities are done in compliance with government, safety and environmental regulations as applicable.</p> <p>Detailed Requirements: Deleted 07-0530 and 10-2100. Added 02-0101, 02-0005, 07-0077, 07-7169, 10-0068, 07-0075, 20-0192</p>
<b>13. Final Outgoing Inspection, Packaging and Shipping</b>	<b>13. Final Outgoing Inspection, Packaging and Shipping</b>
<p>6. Military product shipments will be reviewed and inspected by Military QA to ensure compliance to Mil-Std-883 prior to shipment. This review will consist of the lot traveler, processing and QCI data evaluation for adequacy.</p> <p>Detailed Requirements</p>	<p>6. Military product shipments will be reviewed and inspected by a QA MIL-STD-883 certified inspector prior to shipment. This review will consist of the lot traveler, End of Line processing and QCI data evaluation for adequacy.</p> <p>Detailed Requirements: Deleted 07-0530. Added MIL-I-45208, 07-0006, 07-4018, 04-0319, 10-0062, 07-7169, 10-0068</p>
<b>14. Final Lot Acceptance</b>	<b>14. Final Lot Acceptance</b>
Procedure	Procedure

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<p><b>Document # 10-0137 Rev N</b></p> <p>2. Military Product: The lot is processed similar to section 1; however, prior to the lots release into Boxstock, Military QA reviews the lot's traveler and other associated documentation for adequacy. Military QA is the only one with the authority to release 883 certified products into Boxstock.</p> <p>4. All records created during this function are to be filed for a minimum of 5 years.</p> <p>Detailed Requirements</p>	<p><b>Document #10-0137 Rev P</b></p> <p>2. Military Product: The lot is processed similar to section A however, prior to the lot's release into Boxstock, QA MIL-STD-883 certified inspectors review the lot travelers and other associated documentation for adequacy. Only QA personnel certified to the MIL-STD-883 requirements are authorized to release 883B compliant product into Boxstock.</p> <p>4. All records created during this function are to be filed for a minimum period specified in document #10-0007</p> <p>Detailed Requirements: Added MIL-I-45208, 78-0147, 10-0026, 07-0054</p>
<p><b>15. Control of Vendor and Procured Items</b></p> <p>1. All critical materials must be procured from approved vendors. Vendor approval may be granted based on:</p> <p>2. Once adequate performance has been established and the vendor is approved, the vendor shall be listed on the "Approved Vendors List." Mergers, acquisitions or affiliations associated with supplier's warrants verification of Approved Vendor status.</p> <p>3. All critical materials will be purchased and inspected in accordance with the applicable procurement document and regulatory requirements, if any. The procurement document will specify the tests that the material must be capable of passing, and any additional requirements.</p> <p>4. Verification of the above requirements may be substantiated by a vendor supplied C of C/A, and successful completion of incoming inspection or laboratory test.</p> <p>5. When an Incoming Inspection report is generated, any discrepancies will be noted on this report. All discrepant material will be identified and dispositioned by using the eMRB system. Any material scrapped is submitted to</p>	<p><b>15. Control of Vendor and Procured Items</b></p> <p>1. All critical materials and services must be procured from approved vendors. Vendor approval may be granted based on the following subject to provision of document #10-2515:</p> <p>When specified by the contract, customer nominated vendors will be considered Maxim's approved vendor. Such vendors will be treated the same as regular Maxim's vendor.</p> <p>2. Once adequate performance has been established and/or the vendor is approved, the vendor shall be listed on the "Approved Vendors List. Mergers, acquisitions or affiliations associated with supplier's warrants verification of Approved Vendor status.</p> <p>3. All critical materials will be purchased and inspected in accordance with the applicable procurement document, customer and regulatory requirements, if any. The procurement document will specify the acceptance requirements and/or tests that the material must be capable of passing, and any additional requirements.</p> <p>4. Verification of the above requirements may be substantiated by a vendor supplied C of C/A, and/or successful completion of incoming inspection or laboratory test.</p> <p>5. When an Incoming Inspection report is generated, any discrepancies will be noted on this report. All discrepant material will be identified and dispositioned by using the MRB/eMRB system. Any material</p>

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<p>the eMRB.</p> <p>9. QA &amp; R will review the incoming inspection results on a periodic basis with the appropriate group to determine or adjust the preferred vendor rating list.</p> <p>Detailed Requirements</p>	<p>scrapped is submitted to the MRB/eMRB.</p> <p>9. QA &amp; R will summarize and review the incoming inspection results on a periodic basis with the appropriate group to determine or adjust the preferred vendor rating and list.</p> <p>Detailed Requirements: Added 02-0031, 17-2009, 02-0045, 62-XXXX, 10-0005, 10-0065, 10-0082, 18-1269</p>
<b>16. Customer Returns Analysis Procedure</b>	<b>16. Customer Returns Analysis Procedure</b>
Detailed Requirements:	Detailed Requirements: Added 10-0053, 10-7089
<b>17. Material Review Board</b>	<b>17. Material Review Board</b>
<p>1. An entry is made into the eMRB system defining the discrepancy observed, the quantity of material tested, the test failing, the lot number, and material description. This report is submitted to the MRB for review.</p> <p>3. The MRB consists of the President, VP of Operations, and Quality Assurance. Any other personnel, whose experience or expertise is relevant to the proper disposition of the material may be called upon to provide input.</p> <p>4. It is the MRB's charter to evaluate the discrepancies found, and determine the disposition of the material. The discrepancy is to be evaluated as to its possible impact on production, processing, reliability, or conformance to customer contract. If deemed necessary by MRB, customer will be informed of material status.</p> <p>8. MRB transactions will be kept on file for a minimum of 5 years.</p> <p>Detailed Requirements</p>	<p>1. An entry is made into the MRB/eMRB system defining the discrepancy observed, the quantity of material tested, the test failing, the lot number, and material description. This report is submitted to the MRB for review.</p> <p>3. The MRB consists of the Maxim's executives (top management, operations and Quality). Any other personnel, whose experience or expertise is relevant to the proper disposition of the material may be called upon to provide input.</p> <p>4. It is the MRB's charter to evaluate the discrepancies found, and determine the disposition of the material. The discrepancy is to be evaluated as to its possible impact on production, processing, reliability, or conformance to customer contract and regulatory requirements. If deemed necessary by MRB, customer will be informed of material status.</p> <p>8. MRB transactions will be kept on file for a minimum period as specified in document #10-0007.</p> <p>Detailed Requirements: Added 17-0622</p>
<b>18. Document and Data Control System</b>	<b>18. Document and Data Control System</b>
<p>1. As part of a product's introduction into production, all initial releases of datasheets, test programs, burn-in board diagrams, test schematics, etc., must be entered into Document Control by issuing an ECN.</p> <p>2. Document Control will maintain a minimum sign-off list</p>	<p>1. As part of a product's introduction into production, all initial releases of datasheets, test programs, burn-in board diagrams, test schematics, GBD studies, DFMEAs, design reviews, etc., must be entered into Document Control by issuing an ECN.</p> <p>2. Document Control will maintain a minimum sign-off list</p>

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<p>for each type of ECN. This list will define the personnel necessary for approval. After approval, obsoleted documents are removed from all control points and replaced with the current version.</p> <p>3. Any change to the initial baseline will be documented by the subsequent ECN's. The ECN will describe the change, the reason for change, the effect it has on boxstock, material in line, and material shipped, and the date the change becomes effective.</p> <p>5. Changes classified as major which impact form, fit or function, will require product re-qualification per the guidelines defined by MIL-STD-883, ISO9001 and ISO/TS16949. In addition, Notification of Design Changes will be issued to customers requiring this service by contract, or who are entitled per MIL-STD-883, ISO9001 and ISO/TS16949.</p> <p>8. Changes made to a document shall be a reason to check the effect on related, linked or referenced documents (i.e. PPAPs, FMEAs and Control Plans).</p> <p>Detailed Requirements</p>	<p>for each type of ECN. This list will define the personnel necessary for approval. After approval, obsoleted documents are removed from all control points and replaced with the current version and/or marked as obsolete.</p> <p>3. Any change to the initial baseline will be documented by the subsequent ECN's. The ECN will describe the change, the reason for change, the effect it has on boxstock, material in line, and material shipped, affected documents and the date the change becomes effective.</p> <p>5. Changes classified as major which impact form, fit or function, will require product re-qualification per the guidelines defined by MIL-STD-883, ISO9001 and ISO/TS16949. In addition, Notification of Design Changes will be issued to customers requiring this service by contract, or who are entitled per MIL-STD-883, ISO9001 and ISO/TS16949. Notification of product/process changes will be handled through the Product Change Notification Procedure # 10-0022.</p> <p>8. Changes made to a document shall be a reason to check the effect on related, linked or referenced documents (i.e. PPAPs, FMEAs, Control Plans, etc.).</p> <p>Detailed Requirements: Deleted 04-0015.</p>
<p><b>19. Corrective and Preventive Action System</b></p> <p>Policy</p> <p>Procedure</p> <p>5. Several types of preventive actions exist at Maxim. They include:</p> <p>E. Maintain controls over vendor capabilities and incoming subparts to prevent defective material from reaching Maxim or the product.</p>	<p><b>19. Corrective and Preventive Action System</b></p> <p>Policy</p> <p>..... Corrective actions are designed to eliminate the cause of nonconformities in order to prevent recurrence.</p> <p>Procedure</p> <p>2. Formal corrective action may be in the form specified in document #10-0005 or by the form specified in the particular maxim operating procedure i.e. DMRs</p> <p>5. Several types of preventive actions exist at Maxim. They include:</p> <p>E. Maintain controls over vendor capabilities and incoming subparts to prevent defective material from reaching Maxim operation and/or the product.</p> <p>I. Corrective and preventive actions should incorporate error proofing techniques as much as possible.</p>

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Detailed Requirements	Detailed Requirements: Added, 77-0007, 18-0100, 10-3006, 78-0068, 10-0128, 16-0530
<p><b>20. Inspection System</b></p> <p>3. Sampling plans will be based on MIL-STD-105, MIL-STD-19500, or MIL-STD-883. Maxim's standard AQL (Acceptable Quality Level) for packaged product is 0.1% for both mechanical and electrical requirements. Maxim's standard AQL for die and wafer products is 1.0% for visual, 0.65% for functional electrical testing, 2.5% for parametric DC testing, and 6.5% for untested parameters. These sampling plans are instituted by QA &amp; R in addition to 100% production screening. As per MIL-STD-105, a normal inspection level is used except when a tightened level is required.</p> <p>4. Inspection performed by QA &amp; R inspectors can be identified by the presence of an inspection stamp. These stamps will be issued and controlled by the Quality Assurance Department.</p> <p>Detailed Requirements</p>	<p><b>20. Inspection System</b></p> <p>3. Maxim's sampling plan for all products is based on the 0.1% AQL, C=0 plan from Nicolas L. Squeglia's book "Zero Acceptance Sampling Plans", unless otherwise stated in applicable procedure documents for the inspection being performed. 0.1% AQL sampling is to be used at finalo lot acceptance inspections before inducting newly manufactured product into the warehouse for shipment to customers.</p> <p>Other inspections done throughout the manufacturing flow may also use AQL sampling or may use LTPD sampling, depending on what is most appropriate for the given inspection step.</p> <p>ISO/TS16949 requires zero acceptance for all visual inspections.</p> <p>4. Inspection performed by QA &amp; R inspectors can be identified by the presence of an inspection stamp. These stamps will be issued and controlled by the Quality Assurance Department. This stamp identifies the inspector who released the product at a particular stage.</p> <p>5. Inspection includes visual, dimensional and testing activities as required by the applicable inspection procedure.</p> <p>Detailed Requirements: Deleted 10-7009, 10-7013. Added 44-XXXX, 78-XXXX, 10-0107</p>
<p><b>21. Failure Analysis</b></p> <p>1. Failure analysis requests that could decide the disposition of other material, are to be assigned an RMA number.</p> <p>6. Upon completion of the analysis, a formal report will be issued to the requester and the identified distribution list.</p>	<p><b>21. Failure Analysis</b></p> <p>1. Failure analysis requests that could decide the disposition of customer returned material/samples and other materials, are to be assigned an RMA number.</p> <p>6. Upon completion of the analysis, a formal report will be issued to the requester and the identified distribution list. If corrective action is needed the CAR # will be included in the report.</p>

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<p>7. All documents relating to the Failure Analysis, including a copy of the final report will be contained within the report file.</p> <p>Detailed Requirements</p>	<p>7. All documents relating to the Failure Analysis, including a copy of the final report will be contained within the report file. This file will be maintained for the period specified in document # 10-0007.</p> <p>Detailed Requirements: Added, 55-0020, 10-3006, 56-0022, 56-0019</p>
<p><b>22. Environmental Controls</b></p> <p>Policy</p> <p>Manufacturing, inspection and storage areas are environmentally controlled so that activities in these areas will be clean, orderly and have an appropriate environment that is suitable to ensure product quality and reliability.</p> <p>Procedure</p> <p>3. The environmental control limits for each area will be monitored. Temperature and humidity limits are recorded on a continual basis through the use of self recording instruments. Particulate counts are checked biweekly, unless the criticality of this area requires more frequent monitoring. The data from these monitors will be archived for a minimum of 5 years.</p> <p>Detailed Requirements</p>	<p><b>22. Environmental Controls</b></p> <p>Policy</p> <p>Manufacturing, inspection and storage areas are environmentally controlled where necessary so that activities in these areas will be clean, orderly and have an appropriate environment that is suitable to ensure product quality and reliability.</p> <p>Procedure</p> <p>3. The environmental control limits for each area will be monitored. Temperature and humidity limits are recorded on a continual basis through the use of self recording instruments. Particulate counts are checked biweekly, unless the criticality of this area requires more frequent monitoring. The data from these monitors will be archived for period specified in the document 10-0007.</p> <p>Detailed Requirements: Added 10-0138, 09-0097, 09-0098, 18-1464, 18-1467</p>
<p><b>23. Product and Process Realization</b></p> <p>Detailed Requirements</p>	<p><b>23. Product and Process Realization</b></p> <p>Detailed Requirements: Added 77-0007, 17-7001, 44-0000, 51-0004, 52-0004, 52-7001, 78-0002, 78-0143</p>
<p><b>24. Design and Development Planning</b></p> <p>2. The team will be responsible for: (applicable for automotive)</p> <p style="padding-left: 40px;">c. development and review of control plans</p>	<p><b>24. Design and Development Planning</b></p> <p>2. The team will be responsible for: (applicable for automotive)</p> <p style="padding-left: 40px;">c. development and review of control plans, if applicable</p> <p>7. The organization shall ensure that the personnel with product design responsibility are competent to achieve design requirements and are skilled in applicable tools and techniques either as hired or as trained. Applicable tools and techniques are as</p>

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	<p>specified in the design and new product procedures.</p> <ol style="list-style-type: none"> <li>8. Design and development validation shall be performed in accordance with customer requirements including program timing.</li> <li>9. Prototype program and control plans will be included in the APQP process when required by the customer.</li> <li>10. Production part Approval Process (PPAP) will be completed according to AIAG PPAP Reference Manual.</li> <li>11. Product and Process Initial Objective Specification (IOS) contains the plan for product introduction.</li> <li>12. Process Design and Development input shall be identified and documented and reviewed including product design output data, targets for productivity, process capability and cost, customer requirements if any and experience from previous developments. This also includes application of error-proofing techniques if and when applicable to a degree appropriate to the magnitude of the problems and commensurate with the risks encountered.</li> <li>13. The organization shall identify special characteristics and include them in the control plan, comply with customer-specified definitions and symbols, if any, and identify process control documents including drawings, FMEAs, control plans and operator instructions with the customer special characteristic symbol or notation, if available, to include those process steps that affect special characteristics. Special characteristics can include product characteristics and process parameters.</li> <li>14. The manufacturing design process output shall be expressed in terms that can be verified against manufacturing process design input requirements and validated. The manufacturing process design output shall include specification and drawings, manufacturing process flow chart/layout, manufacturing process FMEAs, control plan, work instructions, process approval acceptance criteria, data for quality, reliability, maintainability and measurability, result of error-proofing activities as appropriate and methods of rapid detection and feedback of product/manufacturing process nonconformities.</li> </ol>

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<p>Detailed Requirements</p> <p><b>25. Electrical Test</b></p> <p>1. All hardware or software will be generated by the Test Engineering organization. Prior to its installation into the production environment, its performance will be validated, and the appropriate documentation relating to all hardware and software will be placed under Document Control.</p> <p>5. Customer supplied test fixtures and test programs will be handled in the same fashion as internally generated test fixtures/programs. It is the responsibility of the customer to ensure that proper documentation, measurement system analysis and evidence of calibration are supplied to Maxim. Maxim's QA &amp; R organization will evaluate these and verify that they meet internally established standards, the customer is advised of any discrepancies. If the customer chooses to waive Maxim's control requirements, a written waiver is required prior to further processing or use of such programs/fixturing.</p> <p>Detailed Requirements</p>	<p>15. Design and development review, design and development validation and design and development verification is applicable to manufacturing process introduction as well.</p> <p>16. Measurements at specified stages of design and development shall be defined, analyzed and reported with summary results as an input to management review. The measurements include quality risks, costs, lead times, critical paths and others as appropriate.</p> <p>17. Changes to design and development of manufacturing process shall be properly and timely documented.</p> <p>Detailed Requirements: Added 52-0004, 30-XXXX, 78-0002,78-0001, 08-0078, 77-0007, 78-0143, 08-0079, 18-0311, 18-0880, 55-0038, 11-0037, 10-0098</p> <p><b>25. Electrical Test</b></p> <p>1. All hardware or software will be generated by the Test Engineering organization. Prior to its installation into the production environment, its performance will be validated, and the appropriate documentation relating to all hardware and software will be placed under Document Control. If deemed applicable, regular validation will be conducted</p> <p>5. Customer supplied test fixtures and test programs, if any, will be handled in the same fashion as internally generated test fixtures/programs. It is the responsibility of the customer to ensure that proper documentation, measurement system analysis and evidence of calibration are supplied to Maxim. Maxim's QA &amp; R organization will evaluate these and verify that they meet internally established standards, the customer is advised of any discrepancies. If the customer chooses to waive Maxim's control requirements, a written waiver is required prior to further processing or use of such programs/fixturing.</p> <p>Detailed Requirements: Deleted 04-4528. Added 04-4028, 78-0002, 77-0007, 77-0008</p>

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<b>26. Rework and Repair</b>	<b>26. Rework and Repair</b>
<p>4. Rework/repair operations shall follow the limitations of MIL-M-38510, Para. 3.7, and ISO/TS16949 para. 8.3.2 except where specifically agreed to by the customer.</p> <p>Detailed Requirements:</p>	<p>4. Rework/repair operations shall follow the limitations of MIL-PRF-38535 paragraph 3.7.1 and ISO/TS16949 para. 8.3.2 except where specifically agreed to by the customer.</p> <p>Detailed Requirements: Deleted 03-7075, 03-7509. Added 11-0128, 11-0037 04-0317, 20-0132, 20-0143</p>
<b>27. Customer or Government Source Audit Inspections</b>	<b>27. Customer or Government Source Audit Inspections</b>
<p>1. Audits/inspections are to be scheduled through Maxim's Marketing or Customer Service organizations. Maxim's MCS organization will identify and organize the visit. An agenda will be established and approved by all other organizations involved.</p> <p>2. A contact, usually the regional MCS person, will be assigned to interface and handle specific details with the customer. Usually, a Quality Assurance representative will also accompany the inspector through the various QA systems, manufacturing operations, and inspections.</p>	<p>1. Audits/inspections are to be scheduled through Maxim's Sales, QA or Customer Service organizations. Maxim's S/QA/CS organization will identify and organize the visit. An agenda will be established and approved by all other organizations involved.</p> <p>2. A contact, usually the regional S/QA/CS person, will be assigned to interface and handle specific details with the customer. Usually, a Quality Assurance representative will also accompany the inspector through the various QA systems, manufacturing operations, and inspections.</p>
<b>28. Statistical Techniques</b>	<b>28. Statistical Techniques</b>
<p>Policy</p> <p>Engineering, Manufacturing, and Quality Assurance shall use valid statistical techniques to objectively quantify processes and products.</p> <p>Description</p> <p>1. Statistical Process Control (SPC) is used to stabilize processes and identify assignable causes. Personnel involved in the SPC program are trained in Problem Solving techniques, Control Charting, and SPC Theory. Control charts are implemented based on recommendations from teams, individuals, and industry standards. Management determines which processes are monitored by Process Capability (Cpk). The Quality Assurance Department is responsible for training and for maintaining reference material.</p> <p>4. Statistical Sampling Plans for inspections are based on MIL-STD-105 and MIL-STD-883.</p>	<p>Policy</p> <p>Engineering, Manufacturing, and Quality Assurance shall use valid statistical techniques to objectively quantify processes and products performance and quality.</p> <p>Description</p> <p>1. Statistical Process Control (SPC) is used to stabilize processes and identify assignable causes. Personnel involved in the SPC program are trained in their particular area of participation like data entry, interpretations, Problem Solving techniques, Control Charting, and SPC Theory. Control charts are implemented based on recommendations from teams, individuals, and industry standards. Management determines which processes are monitored by Process Capability (Cpk). The Quality Assurance Department and/or particular department are/is responsible for training and for maintaining reference material.</p> <p>4. Statistical Sampling Plans for inspections are based on the 0.1% AQL, C=0 plan "Zero</p>

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<p>Maxim's Acceptable Quality Limit (AQL) is 0.1% for both mechanical and electrical requirements of assembled units, except where special plans are required.</p> <p>Detailed Requirements</p>	<p>Acceptance Number Sampling Plans” by Nicholas Squeglia and MIL-STD-883 Method 2005. Maxim's Acceptable Quality Limit (AQL) is 0.1%, C=0 for both mechanical and electrical requirements of assembled units, except where special plans are required.</p> <p>Detailed Requirements: Deleted MIL-STD-105. Added 03-0296</p>
<p><b>29. Laboratory Requirements</b></p> <p><b>Policy</b></p> <p>Maxim will maintain the internal laboratory to do reliability testing and failure Analysis in conformance to ISO/TS16949 requirements. The laboratory will have capability to perform tests as required by AEC-Q-100</p> <p><b>Requirements</b></p> <ol style="list-style-type: none"> <li>1. The internal laboratory will be governed by laboratory procedure for each activity being performed.</li> <li>2. The laboratory will maintain list of qualified personnel to operate the laboratory equipments.</li> <li>3. The laboratory will maintain list of qualified equipments to perform each test.</li> <li>4. The reliability and failure analysis manger has the responsibility to see to it that the laboratory has capability to perform services correctly, traceable to the relevant process standard such as ASTM, EN, etc.)</li> <li>5. QA management has the responsibility to review laboratory related records.</li> </ol>	<p><b>29. Laboratory Requirements</b></p> <p><b>Policy</b></p> <p>Maxim will maintain the internal laboratory to do Reliability testing, Failure Analysis and Calibration in conformance to ISO/TS16949 requirements. The laboratory will have capability to perform tests as required by applicable standards (AEC-Q-100, Mil-Std, JEDEC, etc.).</p> <p>Maxim will use qualified external laboratories if and when needed.</p> <p><b>Requirements for Internal Laboratory</b></p> <ol style="list-style-type: none"> <li>1. The internal laboratory shall have defined scope that includes its capability to perform the required inspection, test or calibration services.</li> <li>2. The internal laboratory shall specify and implement, as a minimum, technical requirements for: <ul style="list-style-type: none"> <li>• adequacy of laboratory procedures</li> <li>• competency of laboratory personnel</li> <li>• testing of the product</li> <li>• capability to perform services correctly, traceable to the relevant process standard (such as ASTM, EN, etc), and</li> <li>• review of related record.</li> </ul> </li> </ol> <p><b>Requirements for External Laboratory</b></p> <ol style="list-style-type: none"> <li>1. The external laboratory shall have defined laboratory scope that includes the capability to perform the required inspection, test or calibration,</li> <li>2 The external laboratory should either: <ul style="list-style-type: none"> <li>• have evidence that the external laboratory is acceptable to the customer or</li> <li>• have accreditation to ISO/IEC 17025 or national</li> </ul> </li> </ol>

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Detailed Requirements	equivalent.  Detailed Requirements: Deleted 10-0152, 10-XXXX Added 55-0013, 55-0020, 55-0034, 56-0019, 56-0022, 16-0523, 10-0021, 16-4037, 10-4009
	<p><b>30. Control of Nonconforming Products Policy</b></p> <p>Maxim will identify, segregate as much as feasible, hold, disposition nonconforming products and execute action as necessary for proper release/shipment of good products.</p> <p><b>Description</b></p> <ol style="list-style-type: none"> <li>1. All nonconforming products at incoming inspection will be identified as nonconforming products using DMRs or equivalent documents.</li> <li>2. All nonconforming products during inprocess and final inspections will be identified as nonconforming products in the inspection status of the traveler as a minimum</li> <li>3. All nonconforming products from returns will be identified as nonconforming using RMA or equivalent document..</li> <li>4. All nonconforming products will be put on hold and segregated as much as possible and/or properly identified until evidence of disposition is available.</li> <li>5. All nonconforming materials will be dispositioned as defined in the applicable specification. Disposition document will be attached to the nonconforming material documentation.</li> <li>6. All actions done to the nonconforming material should be based on applicable instructions. This includes rework that needs to follow work instructions.</li> <li>7. No nonconforming materials can be moved to the operation flow without proper release/authorization for processing and/or shipment.</li> <li>8. Dispositions as scrap should be executed as early as possible to avoid mixing with good parts.</li> <li>9. Parts not meeting specifications may be submitted for customer waiver upon approval by QA management. Only a customer approved waiver can be used as reference for release of this part.</li> </ol>

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	<p>10. Nonconforming materials may be analyzed if the cause for nonconformity has not been determined. Part/samples will be given to Failure Analysis in this case.</p> <p>11. Corrective action will be issued if the failure analysis shows the need for it.</p> <p>12. Containment actions will be initiated as and when necessary.</p> <p>13. Suspect products should be included in the classification of nonconforming products and will be subjected to all actions listed in the applicable procedure</p> <p><b>Detailed Requirements</b></p> <p><b>Maxim specifications:</b></p> <p>10-0053 Control of Nonconforming Parts/Procedure  18-0892 Control of Nonconforming Parts Report  10-0041 Module Assembly DMR Issuance Procedure  18-0687 Module Assembly Discrepant Material Report Form  10-0043 General IQC Piece parts Procedure  10-0045 QA Electrical System Test Requirements  10-3296 Disposition of Nonconforming Materials, MAXFAB  18-4445 Discrepant Material Report  10-0115 Customer Returns Analysis Procedure  10-0535 Material Review Process  03-10-0016 Discrepant Material Report Procedure  75-0004 Material Disposition Guidelines for Maxim  10-0065 MRB Procedure  10-0062 Reject Tag Procedure  10-0132 DMR Procedure</p> <p><b>31. Process Control</b></p> <p><b>Policy</b>  All manufacturing and related operations will run in controlled conditions. Inspection criteria and work instructions should be documented prior to the start of operation and updated as needed. Human resources, bill of materials, equipments and measurement equipments should be provided for by management. Product release, delivery and post delivery activities should be defined and implemented.</p> <p><b>Description</b></p>

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	<ol style="list-style-type: none"> <li>1. Maxim shall plan and carry out production and service provision under controlled conditions. This includes provision and implementation of the following as applicable: <ul style="list-style-type: none"> <li>• Materials</li> <li>• Machines</li> <li>• Manpower</li> <li>• Methods</li> <li>• Environment</li> </ul> </li> <li>2. Maxim shall develop and implement process flows, process FMEAs and control plans for all automotive operations as minimum. Creation of process FMEAs and control plans will take into consideration design records if and when applicable.</li> <li>3. Maxim shall subscribe to AIAG Measurement System Analysis for new equipments and GR&amp;R for legacy equipments. Limits implemented can be % GR&amp;R or the ration of %GR&amp;R to process tolerance depending on operation.</li> <li>4. Maxim shall monitor process data and conduct analysis of those data for continuous improvement of operations. This includes SPC data</li> <li>5. Operation specifications should be updated as needed through Document Control. Any updates should be linked to other related documents like the control plans and process FMEAs,</li> <li>6. Operation personnel should be trained per the provision of the training section of this manual.</li> <li>7. All machines and equipments should be subjected to either/or/combination of calibration, preventive maintenance and MSA/GR&amp;R as defined in the applicable procedure. In addition predictive maintenance should be implemented as a tool for efficient management of equipments and operations.</li> <li>8. Maxim shall prepare documented work instructions for all operations that impact product quality. Instructions shall be accessible in the working area for use as and when needed. These instructions should be based from quality plan, control plan and design provisions.</li> <li>9. Job set-ups should be done as defined in the applicable procedure and is subject to verification.</li> <li>10. Human and space and tools resources should be</li> </ol>

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	<p>provided for by management for efficient flow of operations.</p> <p>11. Outsourced activities, if any should be controlled, verified and monitored as defined in established procedures</p> <p>12. Operations scheduling should be order driven and should comply continuous improvement system like JIT, Lean manufacturing if and when feasible and applicable.</p> <p>13. Special processes are monitored just like regular processes with complete provisions of process element like material, machines, methods, manpower and environment.</p> <p><b>Detailed Requirements</b>  <b>Maxim Specifications</b></p> <p>03-XXXX Wafer Fab Operations Procedures  04-XXXX Wafer Sort Operations Procedures  XX-XXXX Test Operations Procedure  77-XXXX Operations FMEAs  44-XXXX Operations Process Flows/Control Plans  77-0008 Measurement Systems Analysis  78-0002 PFMEA Procedure  78-0066 DFMEA Procedure  08-XXXX Training specs  11-0128 Document Control Procedure  XX-XXXX Calibration Procedure  XX-XXXX Preventive Maintenance Procedures  11-0037 ECN Procedure for Changes to BOMs in MAXCIM  11-0036 Tooling File Procedures</p>