



**Qualified Manufacturers List**  
**Certification and Qualification**  
**Procedures**  
**for**  
**MIL-PRF-38534**  
**Hybrid and MCM Microcircuits**

**SOURCING AND QUALIFICATIONS DIVISION**  
**DLA LAND & MARITIME**  
**COLUMBUS, OHIO**

DLA LAND AND MARITIME-VQH  
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## FOREWORD

This document has been developed to describe procedures necessary to administer and maintain the MIL-PRF-38534 QML Program for Hybrid/MCM (Multi Chip Module) microcircuits. This document is applicable to the QML-38534 administered by DLA Land and Maritime in its capacity as qualifying activity for MIL-PRF-38534.

The QML program provides a means to effectively combine military and commercial programs into a single flexible system and covers a wide range of performance class levels. Manufacturers and users are highly encouraged to use Standard Microcircuit Drawings (SMDs) in order to reduce costs and shorten lead times. Due to the QML quality system's synergy with ISO 9001, we also offer a no cost ISO 9001 registration to QML manufacturers.

I encourage you to provide input for improvements to this or any of the over 220 QMLs/QPLs (Qualified Parts List) we administer.

Any questions or clarification concerning portions of this document should be directed to:

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## DLA LAND AND MARITIME WEB PAGES

Forms, information, newsletters, laboratory suitability lists, specifications, and other helpful material is located on our web sites at:

**VQ HOME PAGE:** ([http://www.landandmaritime.dla.mil/offices/sourcing\\_and\\_qualification/](http://www.landandmaritime.dla.mil/offices/sourcing_and_qualification/))  
(QMLs, part search engines, suitable laboratories, and other)

**VA HOME PAGE:** ([http://www.landandmaritime.dla.mil/offices/doc\\_control/](http://www.landandmaritime.dla.mil/offices/doc_control/))  
(Documents, specifications, standards, SMDs, and other)

**DLA LAND AND MARITIME Home Page:** (<http://www.landandmaritime.dla.mil>)  
(Doing business with DLA Land and Maritime, links to QMLs, QPLs, Specifications, and other)

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# Section I General

## 1. Scope

Procedures for obtaining Qualified Manufacturers List (QML) approval are presented herein. These include an overview of the program, manufacturer eligibility, DLA Land and Maritime and manufacturer's responsibilities, subcontractor use, QML removal conditions, stop shipment conditions, and GIDEP notifications.

## 2. QML Program Overview

QML Listing Process: Two activities lead to a QML listing: The first is a certification audit by the qualifying activity (hereafter referred to as DLA Land and Maritime) to verify the manufacturer's quality system and baselines. This results in MIL-PRF-38534 certification and MIL-STD-883 laboratory suitability. The second is a review of data to qualify the manufacturer's processes and materials. Approval of this data results in a QML listing.

The Manufacturer's Quality Management Program: MIL-PRF-38534, Appendix A details TRB (Technical Review Board) and non-TRB quality management programs. In preparation for and prior to requesting a certification audit, manufacturers implement the program best suited for their business. The most significant difference between the two approaches is that non-TRB manufacturers are required to have DLA Land and Maritime approval of major changes (i.e., more government oversight is required), while the TRB manufacturers can approve major changes through their TRB. Note: The structure of the Quality System may, at the discretion of the manufacturer, be based on other documents, such as ISO 9001. However, a matrix should be developed to show where the Appendix A requirements are met.

DLA Land and Maritime ISO Registration: All QML manufacturers are eligible for ISO 9001 registration through DLA Land and Maritime. This no fee registration is optional and is provided as an added service by DLA Land and Maritime. Further information is available on our WEB site.

Alternatives to the MIL-PRF-38534 Test Flows: Standard verification flows for Classes G, H, K, & E, are listed in MIL-PRF-38534, Appendix C. Verification flows for non-hermetic devices for Classes F and L are listed in MIL-PRF-38534 Appendix D. However, alternatives to those flows may be implemented in accordance with MIL-PRF-38534, provided the performance assured by each verification step is met or demonstrated to be non-value added. These alternates may be limited to specific technologies, materials, or parts as applicable.

Technology Baselines and Facilities: Manufacturers baseline their process and test flows as appropriate for their manufacturing operation in accordance with MIL-PRF-38534. Controlled work areas should be established in accordance with ISO 14644-1 or equivalent.

Qualification: Qualification testing includes testing to failure, or testing to more severe conditions than those used for screening and acceptance testing. Qualification test flows are listed in MIL-PRF-38534. The qualification data is submitted for DLA Land and Maritime review and approval. Once approved, the manufacturer is listed on the QML. Alternate data that meets or exceeds MIL-PRF-38534 may be used. This qualification data can also come from other means, (e.g., existing production test data, existing design

or product qualification test data accumulated for a specific program or customer, etc.) The manufacturer may present the qualification data prior to or during the certification audit, or within an established timeframe after the certification audit.

### **3. Standard Microcircuit Drawings (SMDs)**

Manufacturers are highly encouraged to participate in the SMD program. This program provides documentation for standard microcircuits built to a variety of requirements and classes. These drawings are in a standard format and are maintained by DLA Land and Maritime. SMDs are listed on the QML, MIL-HDBK-103, DLA Land and Maritime part search engines and databases which are available at our WEB site. This provides visibility and sales for the listed manufacturers. The SMD format is recognized and preferred by military and space customers and provides a method for manufacturers to reduce the number of customer specific drawings.

### **4. Device Class Levels**

In order to address users' cost and quality needs, MIL-PRF-38534 provides a choice of 7 product assurance levels. A brief description of each class is as follows:

- Class K      Intended for space level applications.
- Class H      Intended for standard high reliability military applications.
- Class G      Industrial Grade (lowered version of Class H), allows some tests to be guaranteed but not tested.
- Class E      Meets one of the above classes with certain defined exceptions.
- Class D      Built and tested to a manufacturer defined baseline.
- Class L      Standard Quality level for non-hermetic devices.
- Class F      Highest quality level for non-hermetic devices.

More detailed information on the class levels is presented in MIL-PRF-38534.

#### Adding Class Levels to an existing Class H or K line:

Depending on the differences from the Class H or K flows, an audit or qualification data may or may not be necessary to add additional class levels. The following is provided for guidance:

Class E product that does not take exception to design and construction requirements and falls within the qualified baseline would not require an audit or additional data. Class E listing is provided with a Class G, H or K listing.

To gain approval for Classes G or D, the manufacturer provides DLA Land and Maritime process and test flows. If the process flow is the same, an audit probably will not be necessary. If the process or facilities are different or if the test flow includes tests not originally audited, an audit may be required.

The process to gain a QML listing is the same for Classes G, H, and K. Class G and K products that use the same line, processes and materials as class H would not require additional testing or data.

## 5. Manufacturer Eligibility

QML Program Eligibility: To be eligible, manufacturers must produce and provide, or have the potential to provide, hybrids to the U.S. Government or its subcontractors. Because the MIL-PRF-38534 program is structured around microelectronics interconnection, packaging, and testing operations, an important factor for program eligibility is a manufacturer's actual performance of the majority of those operations. While specific operations within a company's manufacturing and screening flow may be subcontracted to outside facilities, the manufacturer must define the manufacturing and screening baseline process flow in order to be considered for MIL-PRF-38534 certification. Where large portions of the manufacturing or assembly and test are performed at an alternate location, DLA Land and Maritime approval is required. (See Paragraph 7 of this section). Reference the baseline process flow requirements of MIL-PRF-38534.

Offshore Facilities: Offshore (outside the United States or its territories) device manufacturing and testing are included under the MIL-PRF-38534 QML program. In general, offshore activities are treated in the same manner as onshore activities with the following additional provisions:

- a. Expenses incurred by DLA Land and Maritime when auditing offshore facilities shall be borne by the sponsoring QML companies.
- b. A statement from a corporate official showing the degree of ownership and control of the offshore facility shall be provided.
- c. DLA Land and Maritime may delegate responsibility to the National Qualifying Activity of the host country.

QML Listing Eligibility: The requirements and procedures of Section II are used to determine the manufacturer's eligibility to be listed on QML-38534, and the scope of the manufacturer's certification and QML listing. Certified manufacturers must agree to conform to all of the QML listing conditions and requirements outlined in MIL-PRF-38534 and herein.

## 6. DLA Land and Maritime/Manufacturer's Responsibilities

DLA Land and Maritime Responsibilities: Support standardized procurement of well defined, reliable hybrid microcircuits and multichip modules and ensure consistent implementation of MIL-PRF-38534 and MIL-STD-883.

### A. Documentation:

1. Provide Standard Microcircuit Drawings (SMDs) to define products for initial and repeat procurement.
2. Provide the List of Standard Microcircuit Drawings (MIL-HDBK-103) as a listing of SMDs.
3. Publish a Qualified Manufacturers List (QML) to provide a shopping list for the military services, OEMs, and various federal and civilian agencies, of proven materials and processes.
4. Write, coordinate, and publish MIL-PRF-38534 and MIL-STD-883.

5. Improve and update specifications based on feedback from customers (e.g., hybrid manufacturers, buyers, and military and space users).
6. Publish and maintain Certification and Qualification Procedures for MIL-PRF-38534 to define the implementation process.
7. List DLA Land and Maritime suitable laboratories for performing QML testing.
8. Publish and maintain a register of DLA Land and Maritime ISO facilities.
9. Publish and maintain Web sites to disseminate information.

B. Implementation:

1. Perform audit/validation to ensure: A qualification program is in place, processes and materials are controlled, product quality and reliability will meet specified levels, a system is in place to address customers' requirements.
2. Review the manufacturer's method of implementation to determine if the methods meet the specified requirement while allowing the flexibility to merge military and commercial practices wherever practical.
3. Answer questions of interpretation from hybrid and MCM users, manufacturers, subcontractors and suppliers.
4. Promote class levels (e.g., K,H,G,E, D, L and F).
5. Review and process qualification reports, retention reports, review process and material changes, and various related technical requirements.
6. Promote the use of SMDs wherever practical in order to achieve standardization across military applications.
7. Promote, review and approve reduction and/or elimination of test where warranted.

**NOTE:** DLA Land and Maritime is not responsible to maintain a QML listing for manufacturers who do not produce QML products.

Manufacturer's Responsibilities: Promote the use of QML products and provide QML products that meet all customer's requirements.

1. Support the use of QML products:
2. Evaluate the use of Standard Microcircuit Drawings (SMDs) for standard product.
3. Consider the potential for SMDs on custom products. An SMD is recommended for standard products, but is not required. Its use can be of benefit to the manufacturer by facilitating the promotion of their product and to the government and users by facilitating standardization.
  - a. Provide technical data for use in generating SMDs.

- b. Supply to SMDs whenever it is practical.
1. B. Establish and Maintain a QML Listing:
  2. Provide information and gain DLA Land and Maritime approval for:
    - a. Facility (Pre-audit and audit/validation information).
    - b. Qualification Reports.
    - c. Retention Reports and Major Changes or TRB reports.
    - d. Corrective actions as required.
    - e. Test Plans (when applicable).
  3. Obtain QML listing for core processes and materials.
  4. Include the benefits of the QML and SMD products in advertising and customer encounters where practical.
  5. Merge military and commercial systems whenever practical.
  6. Provide products that meet all written and implied customer requirements.
  7. Pursue elimination and/or reduction of test where warranted.
  8. Meet all MIL-PRF-38534 requirements where applicable.
- C. Keeping DLA Land and Maritime and Customer's informed
1. Issue GIDEP Alerts or Problem Advisories whenever any quality, performance, or reliability issues are suspected or confirmed to affect shipped product.
  2. Keep DLA Land and Maritime informed of all major changes to standard and/or SMD products, qualified processes/materials, quality system, company ownership and/or management (including quality manager) and facility moves.
  3. Notify DLA Land and Maritime of any failures of a QML product or process/material regardless of where the failure occurred (in-line, customer return, etc.) and regardless of the quality level of the part (H, K, commercial, etc) on which the failure occurred.
  4. Notify customers of major changes as defined for each class level in MIL-PRF-38534.
  5. Notify DLA Land and Maritime immediately after learning of a potential issuance of a GIDEP alert, problem advisory, or major quality/reliability problem affecting their QML product. This includes failure to perform screening or sample testing (including inspection) in accordance with MIL-PRF-38534.

## Consistent Implementation:

1. Provide inputs for changes to MIL-PRF-38534, MIL-STD-883 and SMDs, as appropriate, to ensure the program's correctness and to promote its continuous improvement.
2. Review and implement all revisions, amendments and notices.

## **7. Subcontractor Approval and Use**

QML manufacturers may subcontract operations if documented and approved as part of their certified baseline flow. Responsibility for subcontractor facility compliance is the manufacturer's. DLA Land and Maritime reserves the right to visit manufacturer approved subcontractors to verify that the manufacturer's approval process is effective. Subcontractor facilities may also be those that have been approved by DLA Land and Maritime. These facilities may be stand-alone QML qualified manufacturing facilities, or facilities that have received DLA Land and Maritime approval to perform specific processes or tests on QML product for QML qualified manufacturers (e.g., commercial laboratories with DLA Land and Maritime laboratory suitability to perform MIL-STD-883 test methods).

## 8. QML Removal Conditions

Conditions: A manufacturer may be removed from the QML by DLA Land and Maritime for any of the reasons listed in DoD 4120.24-M, SD-6, and the items listed below.

- a. The manufacturer's QML product does not meet the quality, reliability, or performance requirements of MIL-PRF-38534, and the manufacturer is unable to implement a suitable corrective action plan to return the product to compliance.
- b. The manufacturer has failed to have status reports made available to DLA Land and Maritime in accordance with Section II of this document.
- c. The manufacturer's TRB fails to maintain their certified quality management program and baseline process flow.
- d. Products or materials offered under contract do not meet the requirements of the device acquisition specification.
- e. The manufacturer has terminated manufacturing the technology for which a QML listing was granted.
- f. The manufacturer requests removal from the list.
- g. One or more of the major conditions under which certification and qualification were granted have been violated.
- h. Failure to notify DLA Land and Maritime of a change in design, material, manufacturing facility, process, or fabrication line as required by MIL-PRF-38534 and the company's own quality management system.
- i. An audit of manufacturing facilities and fabrication lines indicates major nonconformance to the applicable specification.
- j. The manufacturer's name appears on the "Consolidated List of Debarred, Ineligible, and Suspended Contractors."
- k. The manufacturer does not notify DLA Land and Maritime immediately after learning of a potential issuance of a GIDEP alert, problem advisory, or major quality/reliability problem affecting their QML product. This includes failure to perform screening or sample testing (including inspection) in accordance with MIL-PRF-38534.
- l. Failure to meet one or more of the manufacturer's responsibilities listed in paragraph 6 as previously agreed upon with DLA Land and Maritime as part of the manufacturer's QML program.

QML Removal Process: Excepting cases of immediate removal for reasons e, f, g, and j, the manufacturer will be notified of the proposed removal of his company from the list and the reasons for removal, and be granted at least 14 days from the date of the notifying letter in which to respond. The manufacturer will be invited to furnish comment. If determination is made to remove a company from the list, the manufacturer will be sent a notification of removal and his company will be deleted from the QML without delay.

## **9. Stop Shipment Conditions**

DLA Land and Maritime reserves the right to issue stop shipment orders whenever there is a question or suspicion that the product does not meet its quality and reliability level and/or the requirements of MIL-PRF-38534 or ancillary requirements are not fully met. DLA Land and Maritime will release shipment after the discrepancies have been satisfactorily addressed by the QML company.

## **10. GIDEP Notifications and MPCAG Alarms**

DLA Land and Maritime reserves the right to issue GIDEP (Government/Industry Data Exchange Program) notifications or MPCAG (Military Parts Control Advisory Group) Alarms whenever a problem discrepancy, etc., may need to be disseminated to industry to avoid possible quality and reliability problems, mission failure or safety/life issues.

## Section II

### Certification, Qualification, QML Retention and Maintenance

#### 1. Certification and Laboratory Suitability

Audit Request: A letter detailing specific pre audit documentation requirements is located on our web site at:

[http://www.dla.land.and.maritime.dla.mil/offices/sourcing\\_and\\_qualification](http://www.dla.land.and.maritime.dla.mil/offices/sourcing_and_qualification).

DLA Land and Maritime acceptance of that information is necessary to confirm an audit date. Audit requests must be made in writing to DLA Land and Maritime -VQ . The manufacturer may also be requested to forward documentation to NASA and Air Force Space and Missile Systems Center (AFSMC) representatives, and other government agencies, as they may participate in the audit.

Implementation of the Quality Management Program: A baseline process flow in accordance with MIL-PRF-38534 shall be implemented, and a self-audit of the implemented system performed and corrective actions completed. The self-audit should take place after an implementation period sufficient to get a realistic snapshot of the quality management program's effectiveness.

Test Optimization/Alternate Methods: Manufacturers may optimize (reduce, eliminate, or modify) tests and inspections based on historical data, alternate methods, statistical process control or other means. Non-TRB and Class K manufacturers must obtain DLA Land and Maritime approval prior to implementing any test optimizations. TRB manufacturers must notify DLA Land and Maritime of any test optimizations. The QML company's product must still be capable of meeting all optimized tests.

Customer Participation: To help users understand the QML process and reduce redundant audits and qualifications, customer participation is encouraged. Therefore, DLA Land and Maritime will, with the approval of the manufacturer, coordinate with the manufacturer to invite pre-selected customers to participate in the audit.

Audit Scheduling: The date, location, and audit areas will be established on a schedule which is mutually acceptable to DLA Land and Maritime and the manufacturer. The extent of participation in the audit by the manufacturer's customers shall also be mutually acceptable to DLA Land and Maritime and the manufacturer. The manufacturer shall be furnished with an audit schedule. The manufacturer may be requested to furnish a copy of the audit documentation package to audit team members from organizations other than DLA Land and Maritime, when they choose to participate in the audit.

Audit: The manufacturer shall make available to DLA Land and Maritime all necessary data and documentation to support the QM program and the manufacturer's baseline process flow during the audit. DLA Land and Maritime access to manufacturing and testing facilities and operators will be required. Audit results will normally be discussed in daily debriefings and will be formalized as part of the final exit debriefing.

**NOTE:** DLA Land and Maritime employees are covered by the Trade Secrets Act 18 U.S.C. Section 1905 and cannot reveal any proprietary information that is witnessed or reviewed during the audit. The manufacturer shall advise other participants if a non-disclosure agreement is required.

**Corrective Actions:** The manufacturer must ensure the corrective actions completely resolve any issues raised. Consideration should be given for each item to determine if it is an isolated issue or evidence of a systemic problem. Each corrective action shall be correlated to a specific audit observation and shall be made available to DLA Land and Maritime. Closure of critical deficiencies must occur prior to the manufacturer being awarded a MIL-PRF-38534 Certification and MIL-STD-883 Laboratory Suitability.

**NOTE:** Certification and laboratory suitability by themselves do not authorize shipment of QML product. Qualification must also occur (i.e., QML Listing).

## **2. Qualification**

**Qualification:** The manufacturer must submit qualification test data and a proposed list of qualified materials and processes to DLA Land and Maritime for review and approval. MIL-PRF-38534 appendix C lists the qualification performance requirements for Classes G, H and K. MIL-PRF-38534 appendix D lists the qualification performance requirements for non-hermetic Classes F and L. These appendices will be used by DLA Land and Maritime to ensure that the data submitted shows that the devices built are capable of meeting the applicable performance requirements. Note: The qualification test flow was specified for small components such as die, chip resistors, small end-terminated capacitors, and molytabs attached using epoxy or solder, and thermosonic and ultrasonic wire-bonding. The manufacturer in concert with DLA Land and Maritime must determine an appropriate test flow to qualify additional technologies such as magnetic attach and large surface-mount capacitors, etc. Class E product that does not take exception to design and construction requirements and falls within the qualified H or K baseline does not require additional data. Class E listing is provided with a Class H or K listing.

Class D test flows are defined by the manufacturer.

For any class, data may be existing commercial, industrial, or military data, or data generated for qualification, or other data as applicable. For example, this data would be from the same certified line, the same process controls, the same procedures etc. (See section III for details concerning qualification).

**QML Listing:** DLA Land and Maritime will notify the manufacturer and list them on the QML when the qualification data has been reviewed and accepted.

**QML Listing Expansion:** To expand a listing or to retain a listing following a major change the manufacturer must provide data to show that devices are capable of meeting the performance requirements.

## **3. QML Listing, Retention, and Maintenance**

**Report:** The manufacturer' shall provide a status report to DLA Land and Maritime describing the status of their line including all significant changes and their impact on microcircuit quality, performance, and interchangeability. Supporting test data shall be retained by the manufacturer. DLA Land and Maritime can request to review the supporting data. The following areas shall be addressed in each status report as a minimum:

- a. TRB meeting minutes if applicable.
- b. Identification by PIN, date code, and number of lots and quantity of devices that have completed groups A, B, C, and D inspections for each class level. The lots shall be organized so that the QML listing which is being retained is readily

identifiable. Information should be formatted such that the periodic CI and PI tests and lots represented by them are clearly presented.

- c. Quantity of QML devices of each class that were shipped during the reporting period.
- d. A list of all QML processes and materials for which there has been no CI and PI. The manufacturer shall certify that they still have the capabilities and facilities to produce these items to the qualified level or remove the processes and materials from the qualified baseline.
- e. Summary of failure analysis results and corrective action of failures which result in changes to the manufacturer's QML listing. Also, identification of lots that failed either PDA, CI or PI, (excluding lots that were resubmitted in accordance with MIL-PRF-38534 Appendix F, and passed) and confirmed lot failures.
- f. List of class E product identifying the referenced class and all exceptions to that class.
- g. A summary of all customers returns of product built using qualified processes and materials. This must include conclusions about failures, disposition of the product, and corrective action if applicable.
- h Self audit results.
- i TRB manufacturers: Major changes, additions, newly qualified processes and materials, alternate methods, and/or improvements in design procedures, fabrication, assembly, test processes, or in the facility.

Note: Major changes, newly qualified processes and materials, and alternate methods by non TRB manufacturers must be reported to DLA Land and Maritime prior to implementation.

Nonconformance: If the summary results indicate nonconformance with the requirements of this specification and MIL-PRF-38534, and corrective action acceptable to DLA Land and Maritime has not been taken, action may be taken to remove the failing processes and materials from the QML. If the QML listed processes and materials have not been used and verified, additional testing may be required to maintain the QML listing. Failure to make the summary report available within 30 days after the 12 month period may result in loss of the manufacturer's QML listing and certification.

Reporting Frequency: Frequency of the reports by TRB companies to DLA Land and Maritime shall be determined by the TRB, but are typically quarterly for the first year following certification and twice annually thereafter. If major problems are encountered, more frequent reports may be required by DLA Land and Maritime. For non-TRB companies, a reporting period will be assigned by DLA Land and Maritime to each company.

Periodic On Site Review (Re-Audit): Following initial certification, DLA Land and Maritime will periodically perform a site review (re-audit) of the manufacturer's facilities, their baselined technology and test flows, and the implementation of the manufacturer's quality management program and records. The initial interval will normally be two years, and will be extended or shortened as the manufacturer's performance warrants.

Use and Maintenance of the Baselined Facilities: After QML listing of a technology on QML-38534, coverage may be expanded to additional products based upon similarities within the baseline process flow and materials. Similarities include all processes and materials which fall into ranges established on the baseline. Therefore, the additional products will be considered covered on the QML by similarity. When other than QML products are being manufactured on a certified line, controls shall be maintained such that the baseline process flow is not adversely impacted.

**NOTE:** DLA Land and Maritime will not continue certification and QML listing for manufacturers who continually fail to produce QML products.

Self-Audit Report: DLA Land and Maritime may modify the frequency of the self-audit or require additional testing based on the self-audit report. A successful self-audit program can be used by DLA Land and Maritime to extend the reaudit interval or reduce the audit time duration. If DLA Land and Maritime determines the self-audit program is ineffective and unacceptable, certification may be withdrawn.

Periodic On Site Review: Following initial certification, DLA Land and Maritime will periodically reaudit the manufacturer's facilities, their baselined technology and test flows, and the implementation of the manufacturer's quality management program and records. The initial interval will normally be two years, and will be extended or shortened as the manufacturer's performance warrants.

Use and Maintenance of the Baselined Facilities: After QML listing of a technology on QML-38534, coverage may be expanded to additional products based upon similarities within the baseline process flow and materials. Similarities include all processes and materials which fall into ranges established on the baseline. Therefore, the additional products will be considered covered on the QML by similarity. When other than QML products are being manufactured on a certified line, controls shall be maintained such that the baseline process flow is not adversely impacted.

## **Section III Qualification Testing for QML Listing**

### **1. General Requirements**

Qualification Testing: Qualification testing shall be performed on devices manufactured and screened in accordance with the manufacturer's quality management system and baselined process flows which have been certified or are intended for certification. Existing data that meets this section may be used.

Test Scheduling Procedures: Qualification shall normally be achieved within 9 months after qualification initiation. DLA Land and Maritime may grant an extension to this period if justification exists. DLA Land and Maritime's review of the test report to determine acceptability shall normally be accomplished within 30 days of receipt.

Test Method Requirements: All tests, test methods, test conditions, and limits shall be in accordance with MIL-STD-883, or the applicable Standard, and the manufacturer's established baseline process flow. Testing shall be performed at facilities which have laboratory suitability granted by DLA Land and Maritime or have been approved by the manufacturer's TRB.

### **2. Test Plan**

Test Plan: The test plan should address the reliability concerns for the given technology. The test flows in MIL-PRF-38534 have been developed to address typical chip and wire hybrid construction. Hybrids with mechanical assembly's, massive high profile elements, potting compounds, or special materials should be evaluated for additional, reduced or alternate tests. DLA Land and Maritime Form 19H may be used to identify the test plan elements. It is recommended that initial qualification plans be reviewed or discussed with DLA Land and Maritime prior to testing. DLA Land and Maritime Form 42H Summary of Qualification Vehicle Processes/Materials, or its equivalent, shall be used to baseline the specific processes and materials in the qualification device.

Qualification Lot: The manufacturer may elect to perform qualification testing on an inspection lot of shippable product or devices specifically designed for QML listing purposes. Devices specifically built for qualification may either be actual product or standard evaluation circuits (reference the definition of a standard evaluation circuit provided in MIL-PRF-38534).

### **3. Test Report**

Test Report: The report shall be presented in an organized format and shall include a summary of the testing performed, results, conclusions, corrective actions, and recommendations.

Documents Submitted with the Report: Fabrication, assembly, screening, and CI and PI/qualification travelers and data shall be made available along with the test report, DLA Land and Maritime Form 42H or equivalent.

Testing Location Diagrams: Diagrams shall be made available along with the test report which details and labels the elements and wirebond test locations on the test vehicle or sample (e.g., die placement and orientation, wire bonding, resistor location, etc.).

Test data: Test data shall be made available to DLA Land and Maritime. This data shall include a summary of attributes for all required tests and measurements including device screening and CI and PI/qualification tests. In addition, variables data shall be made available for the following tests when applicable. For testing performed in accordance with the standard qualification flow provided in MIL-PRF-38534, Appendix C, this data will include:

- a. Group A data and group C end point electrical test data.
- b. Group C internal water vapor and RGA readings.
- c. Group C die shear strength test results, the force at the time of failure and the failure category or the die shear force if no separation occurs.
- d. Group C wire bond strength test results, the forces at the time of failure and the failure category or readings for the devices tested if no failure occurs.
- e. Other data as required by DLA Land and Maritime for alternate test plans.

Disposition of Samples: Samples destructively tested (see MIL-PRF-38534) during qualification testing shall be made available to DLA Land and Maritime with the qualification test report.

#### **4. Test Failures**

Test Failures: Failures should be investigated, have the root cause determined, and appropriate corrective action taken. Confirmation of the effectiveness of the corrective action is typically accomplished by resubmitting samples to the failed test(s). All test failures shall be made available to DLA Land and Maritime, along with (if applicable) the resulting failure analysis and corrective actions needed to assess qualification status or alternatives. Manufacturers may consult with DLA Land and Maritime concerning the nature of the failure, corrective action, retest plans, and sample sizes.

Resubmission due to operator or equipment errors: Resubmission procedures for failures due to equipment or operator errors are described in Appendix A of MIL-PRF-38534.

Termination of Qualification Testing: If a qualification lot is withdrawn due to (1) failing to meet qualification requirements or (2) lack of failure analysis, corrective action, or (3) no retesting is performed, the certification of the process or material (or both) to be covered by that qualification shall be removed by DLA Land and Maritime.