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DEPARTMENT OF DEFENSE HANDBOOK

STANDARD MICROCIRCUIT DRAWINGS

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AMSC N/A

FSC 5962

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FOREWORD

1. This handbook is approved for use by all Departments and Agencies of the Department of Defense.

2. This handbook provides guidance on standard microcircuit drawings (SMD's). The purpose of the SMD program is to minimize the proliferation of specification and source control drawings within the Department of Defense (DoD). The use of one SMD for an item of supply in use by DoD Departments and Agencies is the objective of this program.

3. It is intended that the issue of SMD's affect DoD procurement through minimizing the proliferation of duplicate drawings for an item of supply.

4. It is also the objective of the SMD Program that the resulting drawing be multi-user in actual implementation.

5. The application of this handbook is currently confined to the acquisition of microcircuits until such time that applicability to federal supply classes other than FSC 5962 is deemed appropriate.

6. Comments, suggestions, or questions on this document should be addressed to Commander, Defense Logistics Agency, DLA Land and Maritime, ATTN: VA, P. O. Box 3990, Columbus, OH 43218-3990 or emailed to STD1835@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil/.

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SUMMARY OF CHANGE 1 MODIFICATIONS

1. References to MIL-HDBK-512 has been changed to MIL-STD-3018, which supersedes it.

2. References to MIL-STD-1835 and SD-19 have been added.

3. References to ASME Y14.5M has been changed to ASME Y14.5, which supersedes it.

4. The organization notated as ASME has been changed from American Society of Mechanical Engineers to ASME International to reflect the current name.

5. Section 2, and throughout, the web address for acquiring government specifications and standards has been changed to the current address for the Assist online services.

6. Section 4.2.5.5, Classification of conformance inspections has been edited to include Group E which was missing.

7. In various locations, Defense Supply Center Columbus has been changed to DLA Land Maritime to reflect the current name.

8. Figures 1-6 has been changed to reflect current boiler plates.

9. Where applicable, changes were made to comply with MIL-STD-967 for preparation of a military handbook.

*

SUMMARY OF CHANGE 2 MODIFICATIONS

1. Figures 5, and 6 have been replaced with examples that are more current and follow the latest requirements including provisions for Radiation Hardness Assurance and Class M devices.

2. Section 2, and throughout, the web address for acquiring government specifications and standards has been further changed to the current address for the Assist online services.

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SUMMARY OF CHANGE 2 MODIFICATIONS (Continued)

3. Preparing Activity (PA) has been added to the list of definitions.

4. The responsibilities of MPCAG has changed to the PA in various paragraphs.

5. Listings found in MIL-HDBK-103 can also be found in the appropriate QML.

6. Figure 4, SMD preparation flowchart has been revised to reflect the above listed changes, which are based on current processes.

7. Where applicable, changes were made to comply with MIL-STD-967 for preparation of a military handbook.

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1. SCOPE

1.1 Scope. This handbook provides guidance and information concerning standard microcircuit drawings (SMD's). System applications are subject to the approval of the applicable program office. This handbook is for guidance only and cannot be cited as a requirement.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed below are not necessarily all of the documents referenced herein, but are those needed to understand the information provided by this handbook.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for
MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-883 - Test Method Standard Microcircuits
MIL-STD-1835 - Department of Defense Interface Standard, Electronic Component Case Outlines
MIL-STD-3018 - Parts Management

DEPARTMENT OF DEFENSE HANDBOOK

MIL-HDBK-103 - List of Standard Microcircuit Drawings (SMD's)

* (Copies of these documents are available online at http://quicksearch.dla.mil.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract

DEFENSE STANDARDIZATION PROGRAM OFFICE.

SD-19 - Parts Management Guide

* (Copies of these documents are available online at https://assist.dla.mil.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein.

ASME International (ASME)

ASME Y14.5 - Dimensioning and Tolerancing
ASME Y14.100 - Engineering Drawing Practices

(Copies of these documents are available online at http://www.asme.org/ or from the ASME International, Three Park Avenue, New York, NY 10016-5990)..

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. DEFINITIONS

3.1 Standard microcircuit drawing (SMD). SMD's depict the Government's requirements for an existing commercial item, tested for a military application, disclosing applicable configuration, envelope dimensions, mounting and mating dimensions, interface dimensional characteristics, specified performance requirements, and inspection and acceptance test requirements as appropriate for a military environment.

3.2 General specification. A general specification is prepared in the six-section format and covers requirements and test procedures that are common to a group of parts, materials, or equipment. It is used with either associated device specifications, specification sheets or SMD's (not a mixture); e.g., MIL-PRF-38534 or MIL-PRF-38535 for microcircuits.

3.3 Military Parts Control Advisory Group (MPCAG). A DoD organization which provides advice to the military departments and military contractors on the selection of parts in assigned commodity classes, and collects data on nonstandard parts for developing and updating military specifications and standards.

* 3.4 Preparing Activity (PA). A DoD organization responsible for draft development, user coordination, and release of SMDs for use. For SMDs, the MPCAG evaluation functions are performed by the preparing activity.

4. GENERAL GUIDANCE

4.1 Introduction. This section provides general guidelines regarding contents, organization, and paragraphing applicable to the preparation of SMD's. SMD's should be in a standard drawing format in accordance with the guidance contained herein (see figures 1 and 2).

4.2 Sectional arrangement of an SMD. An SMD contains six sections, titled and numbered as shown below. SMD's should be in standard drawing format in accordance with ASME Y14.100 (see figures 1 and 2).

1. SCOPE
2. APPLICABLE DOCUMENTS
3. REQUIREMENTS
4. VERIFICATION
5. PACKAGING
6. NOTES

4.2.1 Subject matter. Subject matter should be kept within the scope of the sections so that the same requirements or information will always appear in the same section of every SMD. If there is no information pertinent to a section, the following should appear below the section heading:

"This section is not applicable to this drawing".

4.2.2 Section 1.

4.2.2.1 Scope. The scope should repeat the item name and its modifiers, and provide a clear, concise abstract of the coverage of the SMD. This brief statement is the beginning paragraph. The scope should not contain requirements that should be part of section 3. Figures are not included in the scope.

4.2.2.2 Part or Identifying Number (PIN). Section 1 includes a paragraph entitled "PIN" which describes how the SMD PIN is constructed (see 5.3.5.1.2).

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4.2.3 Section 2.

4.2.3.1 Listing of references. Section 2 is used to list those documents referenced in the SMD. Government specifications, standards, adopted non-Government standards, international standardization documents, handbooks, drawings, and approved publications may be referenced in microcircuit drawings. Other non-Government documents promulgated by non-Government standards bodies may also be referenced. Government regulations or codes are referenced as applicable. Military Activity Regulations and other documents not readily available from or through the contracting activity are not referenced in an SMD. Care should be taken in referencing non-Government publications to assure the availability of copies and to acquire prior approval of copyright owner. All those documents identified and referred to in sections 3, 4, and 5 of the SMD are listed in section 2. References are confined to documents currently available at the time of issuance of the SMD. Figures bound integrally with the SMD are not listed in section 2 unless they are reduced-size copies of drawings provided for information only.

4.2.3.1.1 Government documents. Referenced Government documents are listed by document title and identifier excluding revision letters (unless otherwise specified) or suffix (preparing activity symbols) and the "00" designation for "USED IN LIEU OF". The titles should be taken from the documents rather than an index. Government specifications, standards, handbooks, drawing and publications as applicable are listed numerically (except Federal specifications which are listed alpha-numerically) under these headings and in individual groups such as Federal, Military, and Departmental activity (such as Naval Air Systems Command, etc.). These listings should be included under the following paragraph:

"2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract."

The following types of publications should all be listed (as applicable) in the order shown after 2.1.1:

Federal Specifications
Federal Standards
Federal Information Processing Standards
Department of Defense Specifications
Department of Defense Standards
Department of Defense Handbooks

"2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract."

The following types of publications should be listed (as applicable) in the order shown after 2.1.2:

Other Government documents (e.g., Department of Transportation Specifications, U.S. Department of Agriculture Specifications, etc.)

Drawings
Publications

List only those documents that are applicable. Where detailed drawings referred to in an SMD are listed in an assembly drawing, it is only necessary to list the assembly drawing. The following parenthetical source paragraph is included at the end of 2.1.2:

* "(Copies of these documents are available online at (URL) or from (Address).)"

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4.2.3.1.2 Non-Government standards and other publications. Non-Government standards and other publications including DoD adopted documents not normally furnished by the Government should be listed in appropriate order (numerically or alpha-numeric) under the headings of the respective non-Government standard bodies. Titles should be taken from the document rather than from an index. This listing is included under the following subparagraph.

"2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of documents are the issues of the documents cited in the solicitation."

In addition, the following parenthetical source statement follows each individual publication which may be obtained from a common source:

* "(Copies of these documents are available online at (URL) or from (Address).)"

4.2.3.1.3 Order of precedence. In order to avoid confusion in the possible conflict between the requirements of the drawing and the documents referenced therein, the following statement should be included:

"2.3 Order of precedence. In the event of a conflict between the text of this drawing and the reference cited herein the text of this drawing shall take precedence. Nothing in this document, however, supersedes applicable lows and regulations unless a specified exemption has been obtained. "

4.2.4 Section 3.

4.2.4.1 Requirements. Section 3 of the SMD states the necessary requirements (materials, physical and performance characteristics, processes, reliability, human factors, marking, workmanship, etc.) for obtaining the product which the SMD is prepared. The requirements should represent the actual essential needs of the Government to satisfy the intended use and application. Care should be exercised to ensure that the stated essential needs result in acquisition of acceptable quality products at the least life cycle cost to the Government. Requirements should be described in a manner to encourage competition and to avoid restrictive features which would limit acceptance to one or a relatively few contractors. Requirements should be so worded as to provide a definite basis for rejection when testing and examination of product reveals the product is unsuitable for the purpose intended. Care should be exercised to avoid unrealistic or ambiguous requirements and those which conflict with supplier capabilities and referenced documents.

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4.2.4.1.1 Organization of requirements. Care should be taken to provide for a systematic arrangement of requirements to facilitate design, manufacturing, and inspections.

4.2.4.1.2 Sequencing of requirements and tests. When possible, the test paragraphs in section 4 should be placed in the same sequence as the requirement paragraph in section 3. An example of sequencing requirements and tests is as follows:

Requirement	Test
3.6 Shock	4.7.1 Shock
3.7 Vibration	4.7.2 Vibration
3.8 Noise	4.7.3 Noise
3.9 Electromagnetic interference	4.7.4 Electromagnetic interference

4.2.4.2 Materials. Requirements for materials to be used in the item(s) covered by the SMD are stated under this heading, except where it is more practical to include the information in other paragraphs. Requirements of general nature should be followed by specific requirements for the material. Definitive documents should be referenced for the material when such documents cover materials of the minimum required quality.

4.2.4.3 Design. The major functional characteristics should be specified. The intended use is covered in Section 6 of the SMD. Detailed design should be covered in individual paragraphs.

4.2.4.4 Construction. The specified points of construction should be included, as applicable. Construction requirements should be related to the physical limitations imposed and the stresses that equipment is expected to withstand.

4.2.4.5 Hardware. Standard military hardware should be designed into assemblies to the maximum extent possible. This includes mounting hardware when required to be furnished with the product. Selection of the hardware should be made from existing standards (such as MS, NAS, and AN standards), if possible, or from other standards required by contract.

4.2.4.6 Performance characteristics. General and detail performance characteristics should be included under this or other appropriate headings specifying what is expected of the commodity. Each requirement in Section 3 should have a corresponding test method in section 4. The requirement paragraph should reference the applicable test paragraph; "(see 4._)".

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4.2.4.7 Dimensions. Dimensions and tolerances will be in accordance with ASME Y14.5.

4.2.4.8 Finish. Finish should include such properties as surface roughness, freedom from burrs, corrosion, metallic and nonmetallic coatings.

4.2.4.9 Marking. Requirements for marking should reference MIL-PRF-38534 or MIL-PRF-38535. When section 3 specifies that certain item marking is to be placed on the unit container, section 5 should specify the container marking described. When part numbering is a requirement, the section 3 paragraph should reference section 1 paragraph or the appropriate appendix for a description of the part numbering scheme.

4.2.4.10 Selection of alternative materials, construction, etc. When alternate acceptable materials, construction, appearance, or other characteristics are stated in SMD's without specific provisions as to selectivity to be exercised in acquisition, the alternatives are to be considered interchangeable. In such cases, it should be clearly stated in the SMD that the selection of a specific alternative is at the option of the contractor.

* 4.2.4.11 Certificate of compliance. A certificate of compliance (see figure 3) is required from a manufacturer in order to be listed as a source of supply in MIL-HDBK-103 or the appropriate Qualified Manufacturers List (QML) (see 4.2.7.4). The certificate of compliance submitted prior to listing as a source of supply should affirm that the manufacturer's product meets the requirements of the applicable specification (see 6.3).

4.2.4.12 Certificate of conformance. The certificate of conformance should be in accordance with the applicable general specification and should be provided with each lot of items delivered to the SMD.

4.2.4.13 Notification of change or discontinuance. Requirements for notification of change or discontinuance should reference MIL-PRF-38534 or MIL-PRF-38535.

4.2.4.14 Verification and review. The Government retains the option to review the device manufacturer's facility and applicable required documentation.

4.2.5 Section 4.

4.2.5.1 Verification. Section 4 should include all inspections (by reference when applicable) to be performed in order to determine that the item conforms to requirements of sections 3 and 5 of the SMD.

4.2.5.2 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for all inspection requirements specified. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the SMD where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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4.2.5.3 Responsibility for compliance. All items must meet all requirements of sections 3 and 5 of the SMD. The inspection set forth in the SMD should become part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the SMD does not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in conformance inspection does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2.5.4 Conformance inspection. The tests listed in section 4 of the SMD to determine conformance with sections 3 and 5 requirements, should include, when necessary, a measurement or comparison with specified characteristics and checks and tests of the performance and reliability requirements. Each item must meet all sections 3 and 5 requirements. The test methods in section 4 of the SMD are minimum inspection and test methods to be used to document compliance to the SMD requirement.

4.2.5.4.1 Conformance inspection sampling. When it is desirable to specify the sampling procedure to be used by contractors for the performance of conformance inspection, the sampling procedure should:

a. Impose no inspection procedures that are less efficient and effective than would normally be used by the industry.

b. Clearly identify the sampling plan to be used in the manufacturing process when inspections are to be performed at intermediate points, as well as, on the end item.

c. Be capable of assuring compliance with requirements under various conditions of manufacturing or purchasing, e.g., mass or job lot production and large or small lot purchasing.

When inspections are to be based on lots of material, a definition of a lot size(s) should be furnished in this section by reference, if applicable. Restrictions concerning the formation of inspection lots such as restricting inspection lots of units of the same type, class, size, should be specified. Restriction of units forming the lot of those produced from the same assembly line, etc., should also be specified, when applicable.

4.2.5.5 Classification of conformance inspections. Conformance inspections should be classified into group A, B, C, D or E in accordance with the following groupings, when applicable:

Group A - Nondestructive inspections of all items produced or all samples from an inspection lot demonstrate product compliance with contractual requirements. Group A inspection examines characteristics most affected by variations in production processes or skills, and functions vital to successful completion of the design mission.

Group B - Generally nondestructive inspections that are more complex or of a longer duration than group A inspection. Group B inspection examines characteristics more affected by part or equipment quality and less affected by variations in production processes or skills, and functions requiring special fixtures or environments. Fewer samples are inspected than for group A inspections and test articles may be offered for acceptance with little or no refurbishment. Each commodity should be individually evaluated regarding its issue after performing group B and C inspections.

Group C - Periodic and generally destructive tests of characteristics depending upon product design and materials. Group C inspection consists of more complex tests, usually including emulated service environments, is generally destructive and may require major refurbishment before tested articles can be used by the services. Tests are based on production quantities or time period.

Group D - Destructive test or test of long duration that consumes all or a considerable portion of design service life. Articles subjected to group D inspection should not be issued. Tests are performed on few samples based on production quantities or time period.

Group E – Radiation hardness assurance testing performed, generally as an option, to determine the levels of susceptibility for damages that would come from exposure to various doses of radiation. The testing is most commonly performed following burn-in.

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* 4.2.5.6 Tabular listing of conformance inspection. Where it will lead to better understanding of their functions, the inspections should be listed as group A, B, C, D or E in tabular form with appropriate references to applicable requirements, and inspection methods in MIL-STD-883, MIL-PRF-38534, or MIL-PRF-38535. One such example is illustrated below:

" 4.3 Conformance inspection. Conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

Test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters	
Final electrical test parameters	
Group A test requirements	
Groups C and D end-point electrical parameters	

"

4.2.6 Section 5.

4.2.6.1 Packaging, packing, and marking. Packaging, packing, and marking should be as specified in the applicable general specification.

4.2.7 Section 6.

4.2.7.1 Notes. Section 6 should contain information of a general or explanatory nature and no requirements should appear therein. It should contain information designed to assist in determining the applicability of the SMD.

4.2.7.2 Intended use. Items conforming to the SMD are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

4.2.7.3 Comments. Comments on the SMD should be directed to the applicable Preparing Activity (PA).

4.2.7.4 Sources of supply. Sources of supply will be identified in MIL-HDBK-103 or the appropriate Qualified Manufacturers List (QML) (see 4.3). The vendors so listed will have agreed to the SMD and submitted a certificate of compliance (see 4.2.4.11) and completed qualification requirements. Additional sources will be added to these listings as they become available.

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4.3 Approved SMD's. SMD's in use by DoD and industry are listed in MIL-HDBK-103 or the appropriate QML.

4.3.1 SMD user. When a contractor or DoD component has a system application for an existing SMD, as listed in MIL-HDBK-103 or the appropriate QML, it is essential that the applicable MPCAG and PA be informed accordingly and the information be recorded in the SMD Registered Users Database.

4.3.2 Changes to SMD's. Utilizing user identification in accordance with MIL-HDBK-103 or the appropriate QML, proposed changes or draft revisions are coordinated with all users of record (i.e., SMD registered Users Database). Changes are implemented in accordance with the provisions of MIL-PRF-38535. SMD's are maintained by the PA. Approved revisions to SMD's are distributed by the PA to all known users of record (i.e., SMD registered Users Database).

4.3.3 Nonconcurrence with proposed changes. User nonconcurrence with a proposed change to an SMD requires PA resolution of the stated nonconcurrence. Unresolved nonconcurrence will require PA action as appropriate, i.e., nonconcurrence reply, with technical justification, to the originator of the change proposal, new SMD's that address the diverse needs of the users involved, or advisory to user of need to generate new part acquisition documentation.

5. DETAILED GUIDANCE

5.1 Introduction. This section contains guidance for SMD's.

5.2 Drawing preparation. In coordination with and with the approval of the applicable Program Office, a MPCAG (see 3.3) will respond to a parts approval request with a drawing preparation package consisting of the following:

a. Drawing number

b. All known sources of supply

5.3 Initial drawing preparation.

5.3.1 Blank drawings. Blank drawings are not provided. Drawing format should be in conformance to figures 1 and 2.

5.3.2 SMD coordination. Preliminary draft coordinations by the PA with device manufacturers, comment resolution, certificate of compliance transmittal and final SMD preparation should be in conformance with figure 4.

5.3.3 Preliminary and final draft submittal. Preliminary draft will be typed and spaced in accordance with the drawing format (figures 1 and 2). Handwritten or pasted catalog excerpts are not acceptable. This preliminary draft may be on standard 8 1/2" x 11" paper. Once started by the contractor, it is expected that the process described herein will be completed. Preliminary drafts should be clearly marked preliminary draft on the first and last pages.

5.3.3.1 Preliminary draft construction. The preliminary draft is constructed through communication with the applicable MPCAG (see 6.2).

5.3.4 Maintenance. Maintenance of approved SMD's is the responsibility of the applicable MPCAG.

5.3.5 SMD content preparation. The following detail should be reviewed in conjunction with figure 5, especially regarding "boilerplate" location and content. The following detail reflects the current exclusive applicability of SMD's to Microcircuits.

5.3.5.1 Section 1, scope. 1. SCOPE should be as shown on figure 5 and conform to 4.2.2.1 as specified herein.

5.3.5.1.1 Scope. 1.1 Scope. should be as shown on figure 5.

5.3.5.1.2 PIN. The PIN should be structured in accordance with figure 5. The device type should be a two-digit number, assigned sequentially, starting with 01, 02, 03, etc., depending upon how many parts are being included in the drawing.

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5.3.5.1.2.1 PIN length. The length of the PIN should comply with ASME Y14.100 and not exceed 32 characters.

5.3.5.1.3 Radiation hardness assurance (RHA) designator. Radiation hardness assurance should be as shown on figure 5 in 1.2.1.

5.3.5.1.4 Device type(s). Device type(s) should be as shown on figure 5 in 1.2.2.

5.3.5.1.5 Device class designator. The device class designator should be as shown on figure 5 in 1.2.3.

5.3.5.1.6 Case outline. The case outline(s) should be as shown on figure 5 in 1.2.4.

5.3.5.1.7 Lead finish. Lead finish should be as shown on figure 5 in 1.2.5.

5.3.5.1.8 Absolute maximum ratings.

a. The absolute maximum rating will be typed in two columns with dashes connecting as shown in the sample SMD, on figure 6.

b. The absolute maximum ratings will be as defined in the valid characterization data supplied by the manufacturer for the specific part and must include the thermal resistance, as specified in MIL-STD-1835 for the applicable case outline.

c. Foot notes referenced in this paragraph will be located at the bottom of the page.

5.3.5.1.9 Recommended operating conditions.

a. The recommended operating conditions will be typed in two columns with dashes connecting, as shown in the sample SMD, on figure 6.

b. The recommended operating conditions will be as defined in the valid characterization data supplied by the manufacturer for the specific part.

c. Foot notes referenced in paragraph 1.4 will be located at the bottom of the page.

5.3.5.2 SECTION 2, applicable documents. Section 2 should appear as shown on figure 5 and follow the guidelines of 4.2.3 as contained herein.

5.3.5.2.1 Order of precedence. Order of precedence should be as shown on figure 5 in 2.2 and 4.2.3.1.3 as specified herein.

5.3.5.3 Section 3, requirements. Section 3 should appear as shown on figure 5 and the guidelines furnished in 4.2.4. Specific requirement paragraphs should be included in an SMD or on an as required basis.

5.3.5.3.1 Item requirements. Item requirements should be as shown on figure 5 in 3.1.

5.3.5.3.2 Design, construction and physical dimensions. Design, construction and physical dimensions should be as shown on figure 5 in 3.2.

5.3.5.3.3 Terminal connections. Terminal connections should be as shown on figure 5 in 3.2.2.

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5.3.5.3.4 Block diagram. Although figure 5, 3.2.4 specifies block diagram, this paragraph will be used to designate block, functional, or logic diagram, as appropriate, for the device being documented.

5.3.5.3.5 Truth tables. Truth tables should appear as on figure 5 in 3.2.3.

5.3.5.3.6 Case outline(s). Case outline(s) should appear as on figure 5 in 3.2.1.

5.3.5.3.7 Electrical performance characteristics and postirradiation parameter limits. Electrical performance characteristics should be as shown on figure 5 in 3.3. Valid characterization data supplied by the manufacture will determine the use of ambient or case operation temperature range.

5.3.5.3.8 Electrical test requirements. Electrical test requirements should be as shown on figure 5 in 3.4.

5.3.5.3.9 Marking. Marking should be as shown on figure 5 in 3.5.

5.3.5.3.10 Tables. Tables e.g., table I, electrical performance characteristics, should be as shown on figure 5. If necessary, a device type column may be added between the Conditions and group A subgroups column to accommodate differences in test conditions and limits, when more than one device type is being specified.

Required temperature parameters for each specific part will be typed under the heading Conditions, as shown on figure 5.

5.3.5.3.11 Graphics.

a. Views that are referenced as shown on figure 5 in 3.2, will be located after table 1.

b. All data necessary for terminal connections will be identified in a table format or be drawn as defined in MIL-STD-1835. Refer to sample SMD, figure 6.

c. Whenever two different case outlines are required, an additional page will be added to accommodate the required data with figure 1 continued.

d. All data necessary for additional views will be drawn as defined in MIL-PRF-38535. Refer to sample SMD, figure 6. Use valid characterization data supplied by the manufacturer for the specific device type.

e. Switching times test circuit and waveforms that are required will be drawn similar in format to that shown on the sample SMD, figure 6. Use valid characterization data supplied by the manufacturer for the specific device type.

5.3.5.3.12 Certificate of compliance. The certificate of compliance execution should be as shown on figure 5 in 3.6.

5.3.5.3.13 Certificate of conformance. The certificate of conformance should be as shown on figure 5 in 3.7.

5.3.5.3.14 Notification of change. Notification of change should be as shown on figure 5 in 3.8.

5.3.5.3.15 Verification of change. Verification of change should be as shown on figure 5 in 3.9.

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5.3.6 Section 4, verification. Section 4 should appear as shown on figure 5 and 4.2.5 as contained herein.

5.3.6.1 Sampling and inspection. Sampling and inspection should be as shown on figure 5 in 4.1.

5.3.6.2 Screening. Screening should be as shown on figure 5 in 4.2. Valid characterization data supplied by the manufacturer will be used for figure 5, 4.2.1a and 4.2.1b.

5.3.6.3 Qualification inspection. Qualification inspection should be as shown on figure 5 in 4.3.

5.3.6.4 Conformance inspection. Conformance inspection should be as shown on figure 5 in 4.4 and the guidance contained in 4.2.5.4 herein.

5.3.6.4.1 Group A inspection. Additional group A inspection requirements should be as shown on figure 5 in 4.4.1. Valid characterization data supplied by the manufacturer will be used for 4.4.1 subparagraphs (see figure 5).

5.3.6.4.2 Group C inspection. Additional group C inspection requirements should be as shown on figure 5 in 4.4.2. Valid characterization data supplied by the manufacturer will be used for 4.4.2 subparagraphs (see figure 5).

5.3.6.4.3 Group D inspection. Additional group D inspection requirements should be as shown on figure 5 in 4.4.3.

5.3.6.4.4 Group E inspection. Additional group E inspection requirements should be as shown on figure 5 in 4.4.4. Valid characterization data supplied by the manufacturer will be used for 4.4.4 subparagraphs.

5.3.6.5 Tables, electrical tests.

a. The table of electrical test requirements will be formatted as shown on figure 5, table II.

b. The identification of subgroups and tests will be defined in the applicable general specification and valid characterization data supplied by the manufacturer.

c. Any footnote referenced in the table will be located a minimum of two line spaces below the bottom line of the table.

d. Notes using the term guaranteed will not be included as a part of the preliminary draft, before submittal to the sources of supply.

5.3.7 Section 5, packaging. Section 5 should appear as shown on figure 5 and the guidance indicated in 4.2.6.1 as specified herein.

5.3.7.1 Packaging requirements. The packaging requirements should be as shown on figure 5 in 5.1.

5.3.8 Section 6, notes. Section 6 should appear as shown on figure 5 and the guidance in 4.2.7 as specified herein.

5.3.8.1 Intended use. The intended use should be as shown on figure 5 in 6.1 and the guidance in 4.2.7.2 as specified herein.

5.3.8.1.1 Replaceability. The replaceability should be as shown on figure 5 in 6.1.1.

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5.3.8.1.2 Substitutability. The substitutability should be as shown on figure 5 in 6.1.2.

5.3.8.2 Configuration control of SMD's. The configuration control of SMD's should be as shown on figure 5 in 6.2.

5.3.8.3 Record of users. The record of users should be as shown on figure 5 in 6.3.

5.3.8.4 Comments. The comments should be as shown on figure 5 in 6.4.

5.3.8.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions should be as shown on figure 5 in 6.5.

5.3.8.6 Sources of supply. The sources of supply paragraph should be as shown on figure 5 in 6.6.

6. NOTES

6.1 Intended use. The issue of SMD's is intended to minimize the proliferation of duplicate drawings for an item of supply. The use of one drawing for an item of supply within DoD is the objective of the SMD program. SMD's are currently applicable to the acquisition of microcircuits only.

6.1.1 Standard microcircuit drawing program (SMDP). The SMDP is related to the Configuration Management and Parts Management Programs. SMDs are recognized in ASME Y14.100 for application by the DoD for microcircuits compliant with MIL-STD-883. Non-standard microcircuits parts approval is obtained through the procedures of MIL-STD-3018 and SD-19.

6.2 Draft construction. Communication with the MPCAG point of contact for the purpose of draft SMD
* construction will usually be through use of computer or word processor. DLA Land and Maritime - VA, should be contacted concerning system capability, and modem and telecommunication compatibility (see figure 4).

6.3 Certificate of compliance. A Certificate of Compliance (C of C) is a document by which an authorized official of the microcircuit manufacturer certifies that the microcircuit being supplied in accordance with the applicable SMD by the vendor meets the Item Requirements as stated therein. The C of C is delivered by the vendor to the MPCAG with the final SMD.

6.4 Subject term (key word) listing.

Certificate of compliance
Military parts control advisory group
Parts Management program
Standard microcircuit drawing
Qualified manufacturers list

6.5 Change notations. The left margins of this handbook are marked with asterisks to indicate modifications generated by this change. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations.

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REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																			
SHEET																			
REV																			
SHEET	15	16	17																

REV STATUS	REV														
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14

PMIC N/A	PREPARED BY Your name here	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	CHECKED BY	
	APPROVED BY	MICROCIRCUIT, DIGITAL, MONOLITHIC SILICON
	DRAWING APPROVAL DATE	
AMSC N/A	REVISION LEVEL	SIZE A / CAGE CODE 67268 / 5962-XXXXX
		SHEET 1 OF XX

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5962-EXXX

FIGURE 1. Drawing, title sheet.

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FIGURE 2. Drawing, continuation sheet.

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FOR DEVICE CLASSES M, N, Q, T, or V

STANDARD MICROCIRCUIT DRAWING NUMBER REV

DLA Land and Maritime -VA Contact
Telephone: (614) 692-

CERTIFICATE OF COMPLIANCE

MANUFACTURER'S NAME, LOCATION AND CAGE CODE: _____

_____

I (We) have reviewed the enclosed drawing and hereby certify that our MIL-PRF-38535 compliant device(s) or MIL-STD-883 compliant device(s), listed below, meet the requirements of the SMD (The SMD Part Number includes the drawing number, rad hard designator, device type, class designator, case outline, and lead finish designator):

SMD Part Number	Vendor Part Number

(Use a C of C Continuation Sheet if more than 5 part numbers are on the SMD.)

and fabricated, assembled and tested at our plant(s) located in:

Fabrication location(s) : _____

Assembly location(s): _____

Test location(s): _____

PART MEETS OR EXCEEDS THE PERFORMANCE REQUIREMENT OF THE DRAWING/SPECIFICATION EITHER:

☐ as proposed or ☐ with essential comments as marked on draft

PART HAS COMPLETED CONVERSION OF CUSTOMER REQUIREMENTS AND IS COVERED BY

CERTIFICATION AND QUALIFICATION TO MIL-PRF-38535 ☐ YES ☐ NO

or

COMPLIANCE TO MIL-STD-883 (APPENDIX A OF MIL-PRF-38535) ☐ YES ☐ NO

DEVICE CLASS LEVEL: ☐ N ☐ Q ☐ T ☐ V CERTIFICATION MARK: ☐ Q/QML ☐ QD

or

DEVICE CLASS LEVEL: ☐ M COMPLIANCE MARK: ☐ C ☐ D

BURN-IN CIRCUIT IS UNDER DOCUMENT CONTROL AND AVAILABLE UPON REQUEST: ☐ YES ☐ NO

RHA MAXIMUM TOTAL DOSE VALUE: ☐ N/A ☐ M ☐ D ☐ P ☐ L ☐ R ☐ F ☐ G ☐ H

ESD CLASS FOR NEW/REQUALIFIED DEVICES: ☐ 0 ☐ 1A ☐ 1B ☐ 1C ☐ 2 ☐ 3A ☐ 3B
(AS OF 10 SEPT 06)

or

ESD CLASS and VOLTAGE FOR EXISTING DEVICES: ☐ 1 ☐ 2 ☐ 3 VOLTAGE LEVEL: _____
(NO REQUALIFICATION REQUIRED AT THIS TIME)

I (We) understand that this certificate is not to be used nor construed as a guarantee of continued or indefinite availability as an Approved Source for the described drawing item. I further understand that this certificate does not relieve this company from conducting the required testing and lot record keeping detailed in the drawing/specification. I further agree that our company will furnish a separate certificate of conformance in company format, pertaining to actual lot date codes shipped.

_____ Authorized Signature(s)

_____ Date

_____ Name and Title of Authorizing Official (shall be typed)

( ) - _____ Telephone

Submittal of this information to DLA Land and Maritime-VA does not relieve the device manufacturer of the requirements of MIL-PRF-38535. This dated C of C form (3 August 2010) shall not be modified. Modification may result in no acceptance.

Figure 3. Certificate of Compliance.

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CERTIFICATE OF COMPLIANCE CONTINUATION SHEET
FOR DEVICE CLASSES M, N, Q, T or V

STANDARD MICROCIRCUIT DRAWING REV DLA Land and Maritime-VA Contact
Telephone:(614)692-

Date :

I (We) have reviewed the enclosed drawing and hereby certify that our MIL-PRF-38535 compliant device(s), listed below meet the requirements of the SMD (The SMD Part Number includes the drawing number, rad hard designator, device type, class designator, case outline, and lead finish designator):

SMD Part Number	Vendor Part Number

This Continuation Sheet shall be used only if the subject SMD has more than 5 part numbers. This sheet must be accompanied by a completed Certificate of Conformance (C of C) form (3 August 2010). If necessary, this sheet may be duplicated and used as needed for each C of C.

FIGURE 3. Certificate of Compliance - Continued.

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Authorization Criteria
Standard Microcircuit Drawing
Certificate of Compliance
Dated 3 August 2010

The authorized signature shall provide certification signed by the corporate officer responsible for the production of the C of C described product. The responsible corporate officer may delegate authority to sign the C of C to specific individuals within the cognizant quality assurance organization. However, the corporate officer retains responsibility for the accuracy of the C of C.

When authority to sign a C of C is delegated, the responsible corporate office shall submit a letter to DLA Land and Maritime - VA which identifies the name, address, phone number and title of the individual having been granted signature authority.

FIGURE 3. Certificate of Compliance - Continued.

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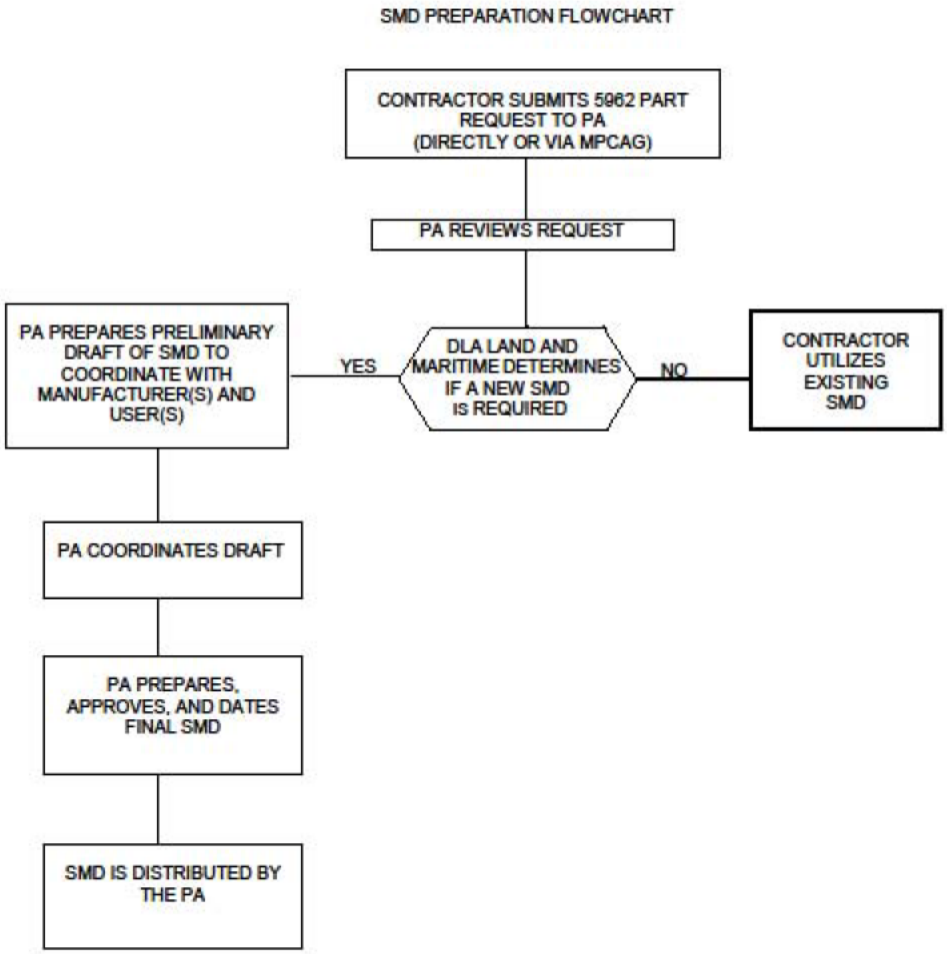

* FIGURE 4: SMD preparation flowchart.

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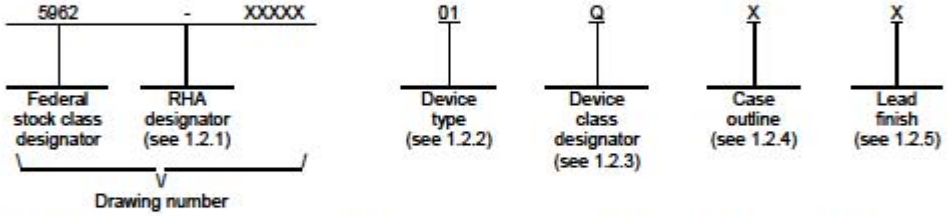
1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device class Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXX

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as follows:

Device class	Device requirements documentation
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	XXXXXXXX	XX	XXXXXXXXXXXXXXXXXXXXXXXX

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

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*

FIGURE 5. SMD boilerplate.

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1.3 Absolute maximum ratings. 1/

1.4 Recommended operating conditions.

1.5 Radiation features.

Maximum total dose available (dose rate = 50 – 300 rads(Si)/s) ..... _____ rads(Si)

Note: All RHA tests performed need to be specified in 1.5 and/or paragraph 4.4.4. Make sure the manufacturer is performing the test if it is specified as such in 4.4.4.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://quicksearch.dla.mil.

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

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* FIGURE 5. SMD boilerplate - Continued.

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3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V shall be in accordance with MIL-PRF-38535 as specified herein, or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure ___.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure ___.

3.2.3 Truth table(s). The truth table(s) shall be as specified on figure ___.

3.2.4 Block or logic diagram(s). The block or logic diagram(s) shall be as specified on figure ___.

3.2.5 Radiation exposure circuit. The radiation exposure circuit shall be as specified on figure ___.

or

3.2.5 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits are as specified in table I and shall apply over the full case operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6.2 herein). The certificate of compliance submitted to DLA Land and Maritime-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 or for device class M in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DLA Land and Maritime-VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change that affects this drawing.

3.9 Verification and review for device class M. For device class M, DLA Land and Maritime, DLA Land and Maritime's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number xxx (see MIL-PRF-38535, appendix A).

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* FIGURE 5. SMD boilerplate - Continued.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ Tc ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	

See footnotes at end of table.

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FIGURE 5. SMD boilerplate - Continued.

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FIGURE 1. Case outline.

FIGURE 2. Terminal connections.

FIGURE 3. Truth table.

FIGURE 4. Block diagram.

FIGURE 5. Timing waveforms.

FIGURE 5. Radiation exposure circuit.

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* FIGURE 5. SMD boilerplate - Continued.

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4. VERIFICATION

4.1 Sampling and inspection. For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection.

4.2.1 Additional criteria for device class M.

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition or . The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein.

4.2.1 Additional criteria for device classes Q and V.

a. The burn-in test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document revision level control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein.

c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections, and as specified herein. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

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* FIGURE 5. SMD boilerplate - Continued.

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4.4.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. For device class M, subgroups 7 and 8 tests shall be sufficient to verify the truth table. For device classes Q and V, subgroups 7 and 8 shall include verifying the functionality of the device.

TABLE II. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class M	Device class Q	Device class V
Interim electrical parameters (see 4.2)			
Final electrical parameters (see 4.2)	1/	1/	2/
Group A test requirements (see 4.4)			
Group C end-point electrical parameters (see 4.4)			
Group D end-point electrical parameters (see 4.4)			
Group E end-point electrical parameters (see 4.4)			

1/ PDA applies to subgroup 1.
2/ PDA applies to subgroups 1 and 7.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table II herein.

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

a. Test condition or . The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

b. T_A = +125°C, minimum.

c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.2.1 Additional criteria for device classes Q and V. The steady-state life test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's TRB in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

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* FIGURE 5. SMD boilerplate - Continued.

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4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table II herein.

4.4.4 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein).

a. End-point electrical parameters shall be as specified in table II herein.

b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5°C, after exposure, to the subgroups specified in table II herein.

Note: All radiation testing being performed must be specified in 4.4.4.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.1.1 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor prepared specification or drawing.

6.1.2 Substitutability. Device class Q devices will replace device class M devices.

6.2 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished using DD Form 1692, Engineering Change Proposal.

6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable to that system. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0540.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in MIL-HDBK-103 and QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

6.6.2 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DLA Land and Maritime-VA.

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* FIGURE 5. SMD boilerplate - Continued.

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REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add post radiation assurance limits to I_{CC+} and I_{CC-} parameters under Table I. Make changes to conditions columns to $+V_{TRIP}$, $-V_{TRIP}$, V_{IO}, and V_{HYST} parameters under Table I. - ro	14-09-18	C. SAFFLE
B	Add paragraph 3.1.1 and Appendix A for microcircuit die. Make change to input voltage (V_{IN}) limit and footnote 5/ as specified under paragraph 1.3. Make change to conditions column for High and Low output supply current parameter under Table IA. Make changes to Table IB. - ro	16-09-08	C. SAFFLE

REV																			
SHEET																			
REV	B	B	B	B	B	B	B	B	B	B	B								
SHEET	15	16	17	18	19	20	21	22	23	24	25								
REV STATUS				REV			B	B	B	B	B	B	B	B	B	B	B	B	B
OF SHEETS				SHEET			1	2	3	4	5	6	7	8	9	10	11	12	13	14

PMIC N/A	PREPARED BY RICK OFFICER	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil
STANDARD MICROCIRCUIT DRAWING	CHECKED BY RAJESH PITHADIA	
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	APPROVED BY CHARLES F. SAFFLE	MICROCIRCUIT, LINEAR, SINGLE, HIGH SPEED COMPARATOR AMPLIFIER, MONOLITHIC SILICON
	DRAWING APPROVAL DATE 14-05-21	
AMSC N/A	REVISION LEVEL B	SIZE A / CAGE CODE 67268 / 5962-10215
		SHEET 1 OF 25

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5962-E538-16

FIGURE 6. Sample SMD.

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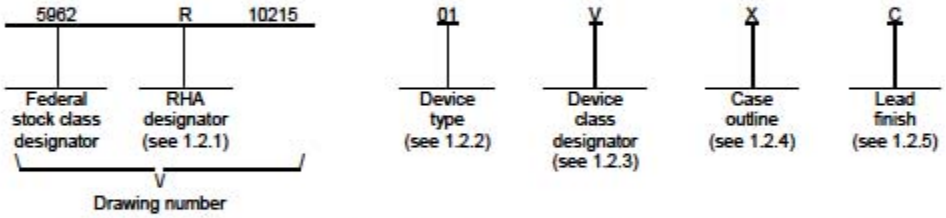
1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device class Q) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	RHR801	Radiation hardened, high speed comparator amplifier

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as follows:

Device class	Device requirements documentation
Q or V	Certification and qualification to MIL-PRF-38535

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	See figure 1	8	Flat pack 1/

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V.

1/ Al_2O_3 ceramic header with metalized bottom side and pullback of 0.01 inch x 0.02 inch.

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* FIGURE 6. Sample SMD - Continued.

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1.3 Absolute maximum ratings. 2/ 3/

Supply voltage (V_{CC})	6 V
Differential input voltage (V_{ID})	2 V 4/
Input voltage (V_{IN})	$-V_{CC}$ – 0.3 V to $+V_{CC}$ + 0.3 V 5/
Storage temperature range (T_{stg})	-65°C to +150°C
Maximum junction temperature (T_J)	+150°C
Thermal resistance, junction-to-ambient (θ_{JA})	125°C/W 6/
Thermal resistance, junction-to-case (θ_{JC})	40°C/W 6/
Lead temperature (soldering, 10 seconds)	+260°C 7/

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	3 V to 5 V
Common-mode input voltage range (V_{ICM})	$-V_{CC}$ + 0.5 V to $+V_{CC}$ - 1.2 V
Ambient operating temperature range (TA)	-55°C to +125°C

1.5 Radiation features.

Maximum total dose available (dose rate = 50 – 300 rads(Si)/s)	100 krads(Si) 8/
Maximum total dose available (dose rate = 10 mrads(Si)/s)	30 krads(Si) 8/
Single event phenomenon (SEP) :	
No single event latch up (SEL) effective LET	≤ 120 MeV/(mg/cm^2)
Single event transient (SET) (σ_{sat} = 3.8 x 10^{-6} cm^2/device) at effective LET	60 MeV/(mg/cm^2)

2/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
3/ All voltage values, except differential voltage are within respect to network ground terminal.
4/ Differential voltage are the non-inverting input terminal with respect to the inverting input terminal.
5/ If the input voltage goes beyond the rails (above $+V_{CC}$ or $-V_{CC}$), the electrostatic discharge (ESD) diodes may be activated. It is required in that case to limit the input current to 10 mA with serial resistor connected on the input.
6/ Short circuits can cause excessive heating and destructive dissipation. Values are normal.
7/ Distance of not less than 1.5 mm from the device body and the same lead shall not be re-soldered until three minutes have elapsed.
8/ For device type 01, this part has been tested at high dose rate, the radiation end point limits for the noted parameters are guaranteed for the conditions specified in MIL-STD-883, method 1019, condition A. For low dose rate, the radiation end point limits for the noted parameters are guaranteed for the conditions specified in MIL-STD-883, method 1019, condition D.

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FIGURE 6. Sample SMD – Continued.

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2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://quicksearch.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL (ASTM)

ASTM F1192 - Standard Guide for the Measurement of Single Event Phenomena (SEP) Induced by Heavy Ion Irradiation of semiconductor Devices.

(Copies of these documents are available online at http://www.astm.org or from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA, 19428-2959).

2.3 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V shall be in accordance with MIL-PRF-38535 as specified herein, or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.1.1 Microcircuit die. For the requirements of microcircuit die, see appendix A to this document.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V.

3.2.1 Case outline. The case outline shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

* FIGURE 6. Sample SMD - Continued.

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3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits are as specified in table IA and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table IIA. The electrical tests for each subgroup are defined in table IA.

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). The certificate of compliance submitted to DLA Land and Maritime-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 shall be provided with each lot of microcircuits delivered to this drawing.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T_A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits Min	Limits Max	Unit
$+V_{CC}$ = 3.3 V, $-V_{CC}$ = 0 V (unless otherwise specified)							
High output supply current	$+I_{CC}$	$+V_{IN}$ = 500 mV, $-V_{IN}$ = 0 V, V_{OUT} = high level, no load	1	01	1.2	1.6	mA
			2		1.4	2.1	
			3		0.95	1.3	
		P, R	1		1.2	2.5	
Low output supply current	$-I_{CC}$	$+V_{IN}$ = 0 V, $-V_{IN}$ = -500 mV, V_{OUT} = low level, no load	1	01	1.3	1.8	mA
			2		1.6	2.3	
			3		1	1.5	
		P, R	1		1.3	3	
High input threshold	$+V_{TRIP}$	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 1.65 V,	2		-8	8	
		V_{ICM} = 2.1 V	3		-8	8	
Low input threshold	$-V_{TRIP}$	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 1.65 V,	2		-8	8	
		V_{ICM} = 2.1 V	3		-8	8	
Input offset voltage	V_{IO}	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 1.65 V,	2		-8	8	
		V_{ICM} = 2.1 V	3		-8	8	
Hysteresis voltage	V_{HYST}	V_{ICM} = 0.5 V,	1	01	1.5	4	mV
		V_{ICM} = 1.65 V,	2		-	20	
		V_{ICM} = 2.1 V	3		-	20	
Non inverting input bias current	$+I_{IB}$	V_{ICM} = 1.65 V	1	01	-5	-	µA
			2		-4	-	
			3		-7	-	
Inverting input bias current	$-I_{IB}$	V_{ICM} = 1.65 V	1	01	-5	-	µA
			2		-4	-	
			3		-7	-	
High level output voltage	V_{OH}	V_{ID} =+1 V, I_{SOURCE} = +3.3 mA.	1	01	3.05	3.3	V
			2		3	3.3	
			3		3.1	3.3	

See footnotes at end of table.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics – continued.

Test	Symbol	Conditions 1/ -55°C ≤ T_A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits Min	Limits Max	Unit
+V_{CC} = 3.3 V, -V_{CC} = 0 V (unless otherwise specified)							
Low level output voltage	V_{OL}	V_{ID} = -1 V, I_{SINK} = -3.3 mA	1	01	-	250	mV
			2		-	300	
			3		-	200	
Output sink current	I_{SINK}	V_{ID} = -500 mV, V_{OUT} = +V_{CC}	1	01	18	22	mA
			2		14	20	
			3		19	26	
Output source current	I_{SOURCE}	V_{ID} = +500 mV, V_{OUT} = -V_{CC}	1	01	20	25	mA
			2		17	23	
			3		22	29	
Propagation time logic "0" to logic "1"	t_{PLH}	50 mV overdrive, C_L = 30 pF, V_{ICM} = 1.65 V	9	01	6	9.5	ns
			10		7	12	
			11		6	9.5	
		100 mV overdrive, C_L = 30 pF, V_{ICM} = 1.65 V	9		5.5	9	
			10		6.5	10.5	
			11		5.5	9	
Propagation time logic "1" to logic "0"	t_{PHL}	50 mV overdrive C_L = 30 pF, V_{ICM} = 1.65 V	9	01	6	9.5	ns
			10		7	12	
			11		6	9.5	
		100 mV overdrive, C_L = 30 pF, V_{ICM} = 1.65 V	9		5.5	9	
			10		6.5	10.5	
			11		5.5	9	
Output rise time	t_R	50 mV overdrive, C_L = 30 pF	9	01	-	9	ns
			10		-	10	
			11		-	10	
Output fall time	t_F	50 mV overdrive, C_L = 30 pF	9	01	-	9	ns
			10		-	10	
			11		-	10	

See footnotes at end of table.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics – continued.

Test	Symbol	Conditions 1/ $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
$+V_{CC}$ = 3.3 V, $-V_{CC}$ = 0 V (unless otherwise specified)							
Maximum input frequency	F_{MAX}	V_{IN} = 1 Vp-p sine wave, C_L = 10 pF, output between 45% and 55%	4	01	55	-	MHz
			5		55	-	
			6		50	-	
Common-mode rejection 2/ ratio ($\Delta V_{IC}/\Delta V_{IO}$)	CMRR	V_{ICM} = 0.5 V to $+V_{CC}$ - 1.2 V	1	01	70	-	dB
			2		50	-	
			3		60	-	
Supply voltage rejection 2/ ratio ($\Delta V_{CC}/\Delta V_{IO}$)	SVR	$+V_{CC}$ = 3 V to 3.6 V, V_{ICM} = 1.65 V	1	01	55	-	dB
			2		42	-	
			3		45	-	

See footnotes at end of table.

* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics – continued.

Test	Symbol	Conditions 1/ -55°C ≤ T_A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits Min	Limits Max	Unit
$+V_{CC}$ = 5 V, $-V_{CC}$ = 0 V (unless otherwise specified)							
High output supply current	$+I_{CC}$	$+V_{IN}$ = 500 mV, $-V_{IN}$ = 0 V, V_{OUT} = high level, no load	1	01	1.3	1.8	mA
			2		1.5	2.3	
			3		1	1.5	
		P, R	1		1.3	6	
Low output supply current	$-I_{CC}$	$+V_{IN}$ = 0 V, $-V_{IN}$ = -500 mV, V_{OUT} = low level, no load	1	01	1.5	2	mA
			2		1.8	2.5	
			3		1.2	1.7	
		P, R	1		1.5	6	
High input threshold	$+V_{TRIP}$	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 2.5 V,	2		-8	8	
		V_{ICM} = 3.8 V	3		-8	8	
Low input threshold	$-V_{TRIP}$	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 2.5 V,	2		-8	8	
		V_{ICM} = 3.8 V	3		-8	8	
Input offset voltage	V_{IO}	V_{ICM} = 0.5 V,	1	01	-7	7	mV
		V_{ICM} = 2.5 V,	2		-8	8	
		V_{ICM} = 3.8 V	3		-8	8	
Hysteresis voltage	V_{HYST}	V_{ICM} = 0.5 V,	1	01	1.5	4	mV
		V_{ICM} = 2.5 V,	2		-	20	
		V_{ICM} = 3.8 V	3		-	20	
Non inverting input bias current	$+I_{IB}$	V_{ICM} = 2.5 V	1	01	-6	-	µA
			2		-5	-	
			3		-8	-	
Inverting input bias current	$-I_{IB}$	V_{ICM} = 2.5 V	1	01	-6	-	µA
			2		-5	-	
			3		-8	-	
High level output voltage	V_{OH}	V_{ID} = +1 V, I_{SOURCE} = +5 mA	1	01	4.7	5	V
			2		4.6	5	
			3		4.8	5	

See footnotes at end of table.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics – continued.

Test	Symbol	Conditions 1/ -55°C ≤ T_A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits Min	Limits Max	Unit
+V_{CC} = 5 V, -V_{CC} = 0 V (unless otherwise specified)							
Low level output voltage	V_{OL}	V_{ID} = -1 V, I_{SINK} = -5 mA	1	01	-	300	mV
			2		-	400	
			3		-	300	
Output sink current	I_{SINK}	V_{ID} = -500 mV, V_{OUT} = +V_{CC}	1	01	30	40	mA
			2		25	35	
			3		30	45	
Output source current	I_{SOURCE}	V_{ID} = +500 mV, V_{OUT} = -V_{CC}	1	01	40	50	mA
			2		35	45	
			3		45	55	
Propagation time logic "0" to logic "1"	t_{PLH}	50 mV overdrive, C_L = 30 pF, V_{ICM} = 2.5 V	9	01	6	9.5	ns
			10		6	10	
			11		5.5	10	
		100 mV overdrive, C_L = 30 pF, V_{ICM} = 2.5 V	9		5.5	9	
			10		5.5	9.5	
			11		5	9	
Propagation time logic "1" to logic "0"	t_{PHL}	50 mV overdrive, C_L = 30 pF, V_{ICM} = 2.5 V	9	01	6	9.5	ns
			10		6	10	
			11		5.5	10	
		100 mV overdrive, C_L = 30 pF, V_{ICM} = 2.5 V	9		5.5	9	
			10		5.5	9.5	
			11		5	9	
Output rise time	t_R	50 mV overdrive, C_L = 30 pF	9	01	-	6	ns
			10		-	7	
			11		-	7	
Output fall time	t_F	50 mV overdrive, C_L = 30 pF	9	01	-	6	ns
			10		-	7	
			11		-	7	

See footnotes at end of table.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IA. Electrical performance characteristics – continued.

Test	Symbol	Conditions 1/ -55°C ≤ T_A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
+VCC = 5 V, -VCC = 0 V (unless otherwise specified)							
Maximum input frequency	f_{MAX}	V_{IN} = 1 Vp-p sine wave, C_L = 10 pF, output between 45% and 55%	4	01	85	-	MHz
			5		90	-	
			6		80	-	
Common-mode rejection 2/ ratio ($\Delta V_{IC}/\Delta V_{IO}$)	CMRR	V_{ICM} = 0.5 V to +VCC - 1.2 V	1	01	70	-	dB
			2		60	-	
			3		60	-	
Supply voltage rejection 2/ ratio ($\Delta V_{CC}/\Delta V_{IO}$)	SVR	+VCC = 4.5 V to 5 V, V_{ICM} = 2.375 V	1	01	60	-	dB
			2		50	-	
			3		50	-	

1/ RHA devices supplied to this drawing have been characterized through all levels M, D, P, L, and R of irradiation. However, this device is tested only at the "P" level for low dose and at the "R" level for high dose rate. Pre and Post irradiation values are identical unless otherwise specified in Table IA. When performing post irradiation electrical measurements for any RHA level, T_A = +25°C. The radiation end points limits for the noted parameters are guaranteed for the conditions specified in MIL-STD-883, method D for low dose rate and condition A for high dose rate.

2/ Parameter tested in go-no-go mode only.

TABLE IB. SEP test limits. 1/ 2/ 3/

Device type	VCC = ±1.5 V and ±2.5 V		Bias VCC = ±2.6 V for latch-up test, No SEL occurs at effective LET 4/
	Single event transient (SET) 5/	Maximum device cross section	
01	LET =60 MeV/(mg/cm^2)	3.8 x 10^{-6} cm^2/device	LET ≤ 120 MeV/(mg/cm^2)

1/ For SEP test conditions, see 4.4.4.4 herein.
2/ Technology characterization and model verification supplemental by in line data may be used in lieu of end of line testing. Test plan must be approved by technical review board (TRB) and qualifying activity.
3/ Worst case temperature is TA = +125°C ±10°C for SEL test and TA = +25°C ±10°C for SET test.
4/ Tested to a LET of ≤120 MeV/(mg/cm^2) for device type 01 with no latch up (SEL).
5/ Single event transient (SET) (σ_{sat} = 3.8 x 10^{-6} cm^2/device) at effective LET= 60 MeV/(mg/cm^2).

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* FIGURE 6. Sample SMD - Continued.

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Case X

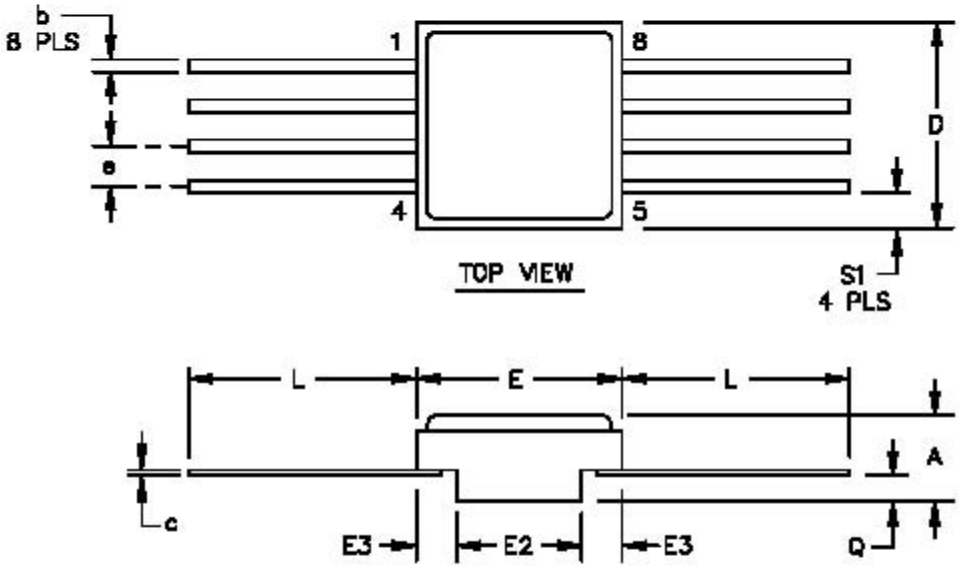

FIGURE 1. Case outline.

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* FIGURE 6. Sample SMD – Continued.

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Case X – continued.

Symbol	Dimensions					
	Inches			Millimeters		
	Min	Med	Max	Min	Med	Max
A	.088	.096	.104	2.24	2.44	2.64
b	.015	.017	.019	0.38	0.43	0.48
c	.004	.005	.006	0.10	0.13	0.16
D	.250	.255	.260	6.35	6.48	6.61
E	.250	.255	.260	6.35	6.48	6.61
E2	.170	.175	.180	4.32	4.45	4.58
E3	.035	.040	.045	0.88	1.01	1.14
e	.050 BSC			1.27 BSC		
L	.256	---	.291	6.51	---	7.38
Q	.026	.031	.036	0.66	0.79	0.92
S1	.036	.044	.052	0.92	1.12	1.32
n	8			8		

NOTES:
1. The US government preferred system of measurement is the metric SI system. However, since this item was originally designed using inch-pound units of measurement, in the event of conflict between the metric and inch pound units, the inch pound units shall take precedence.
2. N is the maximum number of terminal positions.

FIGURE 1. Case outline – continued.

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* FIGURE 6. Sample SMD – Continued.

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Device type	01
Case outline	X
Terminal number	Terminal symbol
1	NC
2	-INPUT
3	+INPUT
4	-Vcc
5	NC
6	OUT
7	+Vcc
8	NC

FIGURE 2. Terminal connections.

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* FIGURE 6. Sample SMD – Continued.

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4. VERIFICATION

4.1 Sampling and inspection. For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection.

4.2.1 Additional criteria for device classes Q and V.

a. The burn-in test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document revision level control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table IIA herein.

c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections, and as specified herein.

4.4.1 Group A inspection.

a. Tests shall be as specified in table IIA herein.

b. Subgroups 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.2.1 Additional criteria for device classes Q and V. The steady-state life test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's TRB in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

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* FIGURE 6. Sample SMD - Continued.

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TABLE IIA. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class Q	Device class V
Interim electrical parameters (see 4.2)	1,9	1,9
Final electrical parameters (see 4.2)	1,2,3,4,5,6, 1/ 9,10,11	1,2,3,4, 1/ 2/ 5,6,9,10,11
Group A test requirements (see 4.4)	1,2,3,4,5,6, 9,10,11	1,2,3,4,5,6, 9,10,11
Group C end-point electrical parameters (see 4.4)	1,2,3,4,5,6, 9,10,11	1,2,3,4, 2/ 5,6,9,10,11
Group D end-point electrical parameters (see 4.4)	1,4,9	1,4,9
Group E end-point electrical parameters (see 4.4)	1,9	1,9

1/ PDA applies to subgroup 1.
2/ Delta limits as specified in table IIB shall be required where specified, and the delta limits shall be computed with reference to the previous electrical parameters.

4.4.4 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein).

a. End-point electrical parameters shall be as specified in table IIA herein.

b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table IA at TA = +25°C ±5°C, after exposure, to the subgroups specified in table IIA herein.

4.4.4.1 Total dose irradiation testing. Total dose irradiation testing shall be performed in accordance with MIL-STD-883 method 1019 condition A and condition D as specified herein.

4.4.4.1.1 Accelerated annealing test. Accelerated annealing testing shall be performed on all devices requiring a RHA level greater than 5 krads (Si). The post-anneal end-point electrical parameter limits shall be as specified in table IA herein and shall be the pre-irradiation end-point electrical parameter limits at 25°C ±5°C. Testing shall be performed at initial qualification and after any design or process changes which may affect the RHA response of the device.

4.4.4.2 Dose rate induced latchup testing. When required by the customer, dose rate induced latchup testing shall be performed in accordance with test method 1020 of MIL-STD-883 and as specified herein. Tests shall be performed on devices, SEC, or approved test structures at technology qualification and after any design or process changes which may effect the RHA capability of the process.

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* FIGURE 6. Sample SMD – Continued.

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TABLE IIB. Burn-in and operating life test delta parameters.

Parameters	Symbol	Test conditions	Delta limits	Units
Change high output supply current	$\Delta+I_{CC}$	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, $+V_{IN}$ = 1 V, $-V_{IN}$ = 0 V, V_{OUT} = high level, no load	± 20	µA
Change low output supply current	$\Delta-I_{CC}$	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, $+V_{IN}$ = 0 V, $-V_{IN}$ = 1 V, V_{OUT} = low level, no load	± 20	µA
Change input offset voltage	ΔV_{IO}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, $V_{ICM} = V_{CC/2}$	± 1	mV
Change hysteresis voltage	ΔV_{HYST}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, $V_{ICM} = V_{CC/2}$	± 400	µV
Change non inverting input bias current	$\Delta+I_B$	$+V_{CC}$ = 5 V, $-V_{CC}$ = 0 V, $V_{ICM} = V_{CC/2}$	± 500	nA
Change inverting input bias current	$\Delta-I_B$	$+V_{CC}$ = 5 V, $-V_{CC}$ = 0 V, $V_{ICM} = V_{CC/2}$	± 500	nA
Change high level output voltage	ΔV_{OH}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, V_{ID} = +1 V, I_{SOURCE} = 3.3 mA or 5 mA	± 5	mV
Change low level output voltage	ΔV_{OL}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, V_{ID} = -1 V, I_{SINK}= 3.3 mA or 5 mA	± 10	mV
Change output sink current	ΔI_{SINK}	$+V_{CC}$ = 3.3 V, $-V_{CC}$ = 0 V, V_{ID} = -500 mV, $V_{OUT} = +V_{CC}$	± 100	µA
		$+V_{CC}$ = 3.3 V, $-V_{CC}$ = 0 V, V_{ID} = -500 mV, $V_{OUT} = +V_{CC}$	± 200	µA
Change output source current	ΔI_{SOURCE}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, V_{ID} = +500 mV $V_{OUT} = -V_{CC}$	± 800	µA
Change propagation time logic "0" to "1"	Δt_{PLH}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, 100 mV overdrive, C_L = 30 pF	± 200	ps
Change propagation time logic "1" to "0"	Δt_{PHL}	$+V_{CC}$ = 3.3 V or 5 V, $-V_{CC}$ = 0 V, 100 mV overdrive, C_L = 30 pF	± 200	ps

1/ Deltas are performed at room temperature, T_A = +25°C.

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* FIGURE 6. Sample SMD – Continued.

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4.4.4.3 Single event phenomena (SEP). When specified in the purchase order or contract, SEP testing shall be performed on class V devices. SEP testing shall be performed on the Standard Evaluation Circuit (SEC) or alternate SEP test vehicle as approved by the qualifying activity at initial qualification and after any design or process changes which may affect the upset or latchup characteristics. Test four devices with zero failures. ASTM F1192 may be used as a guideline when performing SEP testing. The recommended test conditions for SEP are as follows:

a. The ion beam angle of incidence shall be between normal to the die surface and 60° to the normal, inclusive (for example: 0° ≤ angle ≤ 60°). No shadowing of the ion beam due to fixturing or package related affects is allowed.

b. The fluence shall be ≥ 100 errors or ≥ 10^7 ions/cm^2.

c. The flux shall be between 10^2 and 10^5 ions/cm^2/s. The cross-section shall be verified to be flux independent by measuring the cross-section at two flux rates which differ by at least an order of magnitude.

d. The particle range shall be ≥ 20 micron in silicon.

e. The test temperature shall be +25°C for the transient measurements and the maximum rated operating temperature ±10°C for the latchup measurements.

f. Bias conditions shall be V_{CC} = V_{CC} maximum for the latchup measurements.

g. For SEL test limits, see Table IB herein.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.1.1 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor prepared specification or drawing.

6.2 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished using DD Form 1692, Engineering Change Proposal.

6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable to that system. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0540.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in MIL-HDBK-103 and QML-38535. The vendors listed in MIL-HDBK-103 and QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

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* FIGURE 6. Sample SMD – Continued.

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6.7 Additional information. When applicable, a copy of the following additional data shall be maintained and available from the device manufacturer:

a. RHA upset levels.

b. Test conditions (SEP).

c. Number of transients (SEP).

d. Occurrence of latchup (SEL).

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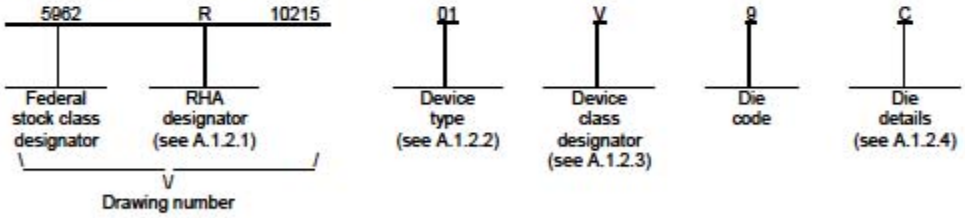
APPENDIX A
APPENDIX A FORMS A PART OF SMD 5962-10215

A.1 SCOPE

A.1.1 Scope. This appendix establishes minimum requirements for microcircuit die to be supplied under the Qualified Manufacturers List (QML) Program. QML microcircuit die meeting the requirements of MIL-PRF-38535 and the manufacturers approved QM plan for use in monolithic microcircuits, multi-chip modules (MCMs), hybrids, electronic modules, or devices using chip and wire designs in accordance with MIL-PRF-38534 are specified herein. Two product assurance classes consisting of military high reliability (device class Q) and space application (device class V) are reflected in the Part or Identification Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

A.1.2 PIN. The PIN is as shown in the following example:



A.1.2.1 RHA designator. Device classes Q and V RHA identified die meet the MIL-PRF-38535 specified RHA levels. A dash (-) indicates a non-RHA die.

A.1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	RHR801	Radiation hardened, high speed comparator amplifier

A.1.2.3 Device class designator.

Device class	Device requirements documentation
Q or V	Certification and qualification to the die requirements of MIL-PRF-38535

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A.1.2.4 Die details. The die details designation is a unique letter which designates the die's physical dimensions, bonding pad location(s) and related electrical function(s), interface materials, and other assembly related information, for each product and variant supplied to this appendix.

A.1.2.4.1 Die physical dimensions.

Die type	Figure number
01	A-1

A.1.2.4.2 Die bonding pad locations and electrical functions.

Die type	Figure number
01	A-1

A.1.2.4.3 Interface materials.

Die type	Figure number
01	A-1

A.1.2.4.4 Assembly related information.

Die type	Figure number
01	A-1

A.1.3 Absolute maximum ratings. See paragraph 1.3 herein for details.

A.1.4 Recommended operating conditions. See paragraph 1.4 herein for details.

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A.2 APPLICABLE DOCUMENTS.

A.2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-883 - Test Method Standard Microcircuits.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://quicksearch.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

A.2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

A.3 REQUIREMENTS

A.3.1 Item requirements. The individual item requirements for device classes Q and V shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

A.3.2 Design, construction and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein and the manufacturer's QM plan for device classes Q and V.

A.3.2.1 Die physical dimensions. The die physical dimensions shall be as specified in A.1.2.4.1 and on figure A-1.

A.3.2.2 Die bonding pad locations and electrical functions. The die bonding pad locations and electrical functions shall be as specified in A.1.2.4.2 and on figure A-1.

A.3.2.3 Interface materials. The interface materials for the die shall be as specified in A.1.2.4.3 and on figure A-1.

A.3.2.4 Assembly related information. The assembly related information shall be as specified in A.1.2.4.4 and on figure A-1.

A.3.2.5 Radiation exposure circuit. The radiation exposure circuit shall be as defined in paragraph 3.2.3 herein.

A.3.3 Electrical performance characteristics and post-irradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and post-irradiation parameter limits are as specified in table IA of the body of this document.

A.3.4 Electrical test requirements. The wafer probe test requirements shall include functional and parametric testing sufficient to make the packaged die capable of meeting the electrical performance requirements in table IA.

A.3.5 Marking. As a minimum, each unique lot of die, loaded in single or multiple stack of carriers, for shipment to a customer, shall be identified with the wafer lot number, the certification mark, the manufacturer's identification and the PIN listed in A.1.2 herein. The certification mark shall be a "QML" or "Q" as required by MIL-PRF-38535.

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A.3.6 Certification of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see A.6.4 herein). The certificate of compliance submitted to DLA Land and Maritime -VA prior to listing as an approved source of supply for this appendix shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and the requirements herein.

A.3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 shall be provided with each lot of microcircuit die delivered to this drawing.

A.4 VERIFICATION

A.4.1 Sampling and inspection. For device classes Q and V, die sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modifications in the QM plan shall not affect the form, fit, or function as described herein.

A.4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and as defined in the manufacturer's QM plan. As a minimum, it shall consist of:

a. Wafer lot acceptance for class V product using the criteria defined in MIL-STD-883, method 5007.

b. 100% wafer probe (see paragraph A.3.4 herein).

c. 100% internal visual inspection to the applicable class Q or V criteria defined in MIL-STD-883, method 2010 or the alternate procedures allowed in MIL-STD-883, method 5004.

A.4.3 Conformance inspection.

A.4.3.1 Group E inspection. Group E inspection is required only for parts intended to be identified as radiation assured (see A.3.5 herein). RHA levels for device classes Q and V shall be as specified in MIL-PRF-38535. End point electrical testing of packaged die shall be as specified in table IIA herein. Group E tests and conditions are as specified in paragraphs 4.4.4, 4.4.4.1, 4.4.4.1.1, 4.4.4.2, and 4.4.4.3 herein.

A.5 DIE CARRIER

A.5.1 Die carrier requirements. The requirements for the die carrier shall be accordance with the manufacturer's QM plan or as specified in the purchase order by the acquiring activity. The die carrier shall provide adequate physical, mechanical and electrostatic protection.

A.6 NOTES

A.6.1 Intended use. Microcircuit die conforming to this drawing are intended for use in microcircuits built in accordance with MIL-PRF-38535 or MIL-PRF-38534 for government microcircuit applications (original equipment), design applications, and logistics purposes.

A.6.2 Comments. Comments on this appendix should be directed to DLA Land and Maritime -VA, Columbus, Ohio, 43218-3990 or telephone (614)-692-0540.

A.6.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

A.6.4 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in QML-38535. The vendors listed within MIL-HDBK-103 and QML-38535 have submitted a certificate of compliance (see A.3.6 herein) to DLA Land and Maritime -VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-10215
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FIGURE 6. Sample SMD – Continued.

*

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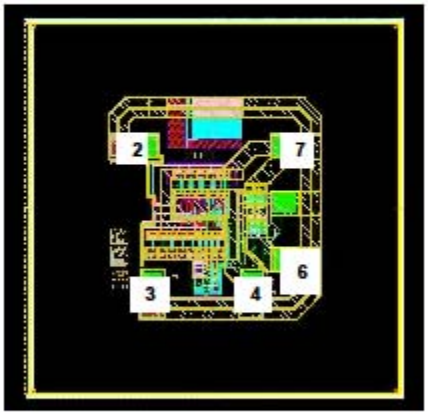
APPENDIX A
APPENDIX A FORMS A PART OF SMD 5962-10215



Pad names	Pad coordinate	
	X	Y
-IN	-186.75	+164.5
+IN	-164.65	-197.5
-Vcc	+99	-198
OUT	+186.75	-135.6
+Vcc	+186.75	+164.5

NOTE: Pad numbers reflect terminal numbers when placed in case outline X (see figure 1).

FIGURE A-1. Die bonding pad locations and electrical functions.

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* FIGURE 6. Sample SMD – Continued.

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APPENDIX A
APPENDIX A FORMS A PART OF SMD 5962-10215

Die bonding pad locations and electrical functions

Die physical dimensions.
Die size: 50 mils x 45 mils
Die thickness: 375 µm ± 20 µm
Pad size: 58 µm x 71 µm

Interface materials.
Top metallization: Metal 1: W = 0.6 µm (±0.0 6 µm)
Metal 2: Ti/AlCu/TiN = 0.607 µm (±0.061 µm)
Metal 3: Ti/AlCu/TiN = 0.607 µm (±0.061 µm)
Metal 4: Ti/AlCu/TiN = 0.607 µm (±0.061 µm)
Metal 5: Ti/AlCu/TiN = 2.5 µm (±0.25 µm)

Backside metallization: None

Glassivation.
Type: P. Vapox + Nitride
Thickness: 0.5 µm ± 0.05 µm + 0.6 µm ± 0.055 µm

Substrate: Silicon

Assembly related information.
Substrate potential:
Special assembly instructions: None

FIGURE A-1. Die bonding pad locations and electrical functions - continued.

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* FIGURE 6. Sample SMD – Continued.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 16-09-08

Approved sources of supply for SMD 5962-10215 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DLA Land and Maritime-VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DLA Land and Maritime maintains an online database of all current sources of supply at https://landandmaritimeapps.dla.mil/Programs/Smcr/.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962R1021501VXC	F8859	RHR801K01V
5962R1021501V9C	F8859	RHR801D2V

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
F8859	ST Microelectronics 3 rue de Suisse CS 60816 35208 RENNES cedex2-FRANCE

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in the information bulletin.

* FIGURE 6. Sample SMD – Continued.

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Custodians:
Army - CR
Navy - EC
Air Force - 85
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Review activities:
Army - AR, MI, SM
Navy - AS, CG, MC, SH
Air Force - 03, 19, 99

Preparing activity:
DLA-CC

* (Project 5962-2017-001)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the
* ASSIST Online database at https://assist.dla.mil.