DSCC Form 19W [July 2008]

Application/Authorization to Conduct Qualification Testing for MIL-PRF-55110, MIL-P-50884

Superseding DSCC Form 19W [June 2008]

GENERAL INFORMATION

WHEN TO USE THIS FORM:

- To begin the qualification process to gain approval for MIL-PRF-55110 or MIL-P-50884 production.
- For re-qualification (required three years from a manufacturer's previous qualification date).

THE QUALIFICATION PROCESS

1) The manufacturer completes section I of page 4 of this form and submits it to the Qualifying Activity (further referenced as DSCC) along with the additional information noted in the section, ***What to Submit to DSCC***.
2) DSCC reviews and evaluates the information provided and if approved, will return page 4 of this form, with section II completed, to the manufacturer. Authorizations to conduct qualification testing are valid for 12 months from approval date.
3) The manufacturer builds a production lot of qualification test specimens in accordance with paragraph A.4.5.2.2 of MIL-PRF-55110 or MIL-P-50884. Qualification test specimens (Zones A, B, C, and D) must be manufactured at the plant location(s) indicated in section I.
   a) The manufacturer shall perform MTR testing as specified in Table A-II of MIL-PRF-55110 or MIL-P-50884.
   b) The MTR inspection shall consist of all qualification test specimens in the production lot. Sample sizes shall reflect the entire lot.
   c) A minimum of two untested partial qualification test specimens (Zones A, B, and C) shall be retained by the manufacturer for a period of 36 months after approval date.
   d) The manufacturer submits a package to a certified laboratory for qualification testing (see the following section, ***What to Submit to Laboratory***).
4) When testing is complete, the laboratory compiles and submits a qualification test report to DSCC.
5) DSCC will evaluate the laboratory test report and manufacturer's test results, and grant qualification or take other action(s) as applicable.

WHAT TO SUBMIT TO THE QUALIFYING ACTIVITY (DSCC)

- Page 4 of this form (section I must be completed and signed).
- A current list of the calibrated equipment to be used for in-house testing (in-process and MTR testing per the specification).
- Product Assurance Information (see A.4.5.5.2 of either the MIL-P-50884 or the MIL-PRF-55110), including:
  - In-process and group A testing procedures and checklists.
  - Test coupon quantity, design, and placement procedures.
  - Group B complexity and selection procedure.

WHAT TO SUBMIT TO LABORATORY

- Page 4 of this form (Sections I & II must be completed and signed).
- Manufacturer's standard in-process and group A test data sheets showing MTR test results.
- Manufacturer's traveler used for production of qualification test specimens.
- Manufacturer's microsections (as-received and thermal stress) and solderability test specimens for the entire qualification lot.
- Two untested partial qualification test specimens (Zones A, B, and C) for lab testing.
- Copies of certificates of conformance for all materials used for production of qualification test specimens.

OTHER CONSIDERATIONS

- If any disqualifying or test equipment issues arise during qualification testing, discontinue testing and contact DSCC for instruction. DSCC shall be notified within three (3) business days.
- The completed qualification package (including the manufacturer and certified-laboratory report, data, and used test vehicles) ***must*** be received by DSCC at least 45 days prior to expiration of qualification to allow ample time for processing.
- Inspection of qualification test specimens shall not begin until the manufacturer has received an approved 19W from DSCC.
- Manufacturers listed on QPL–55110 or QPL-50884 will be required to undergo periodic on-site audits of their facilities by the qualifying activity.

FOR FURTHER INFORMATION: Please contact DSCC (office VQE) by mail, phone, fax, or e-mail. This document is available at the DSCC-VQE web site (see URL below).

Defense Supply Center Columbus
DSCC-VQE
P. O. Box 3990
Columbus, OH 43218-3990

For express packages:
3990 East Broad Street
Columbus, OH 43213
ATTN: DSCC-VQE

Telephone: (614) 692-0627

Facsimile: (614) 693-1659

URL: www.dscc.dla.mil/offices/VQ

E-mail: 5998.Qualifications@dla.mil

REFERENCED DOCUMENTS

U.S. Government Documents are available via ASSIST Quicksearch online (http://assist.daps.dla.mil/) or have direct links below. Commercial documents must be purchased from the respective non-Government standards organization.

Government:

SD-6, Provisions Governing Qualification
Document Automation and Production Services (DAPS)
Building 4D (DPM-DODSSP) • 700 Robbins Avenue
Philadelphia, PA 19111-5094
http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=108148

DSCC Form 36W – Retention Reporting
http://www.dscc.dla.mil/downloads/VQGeneral/FE36Wcurrent.pdf

Retention Reporting Period
http://www.dscc.dla.mil/downloads/VQGeneral/IEPWBQPLperiods.pdf

MIL-PRF-55110
http://www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-PRF-55110

QPL-55110
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=55110

MIL-PRF-50884
http://www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-P-50884

QPL-50884
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=50884

Certified Laboratory List
http://www.dscc.dla.mil/downloads/VQGeneral/IEPWBLABCURRENT.pdf

DSCC Form 19W – Application/Authorization to Conduct Qualification Testing for MIL-PRF-55110, MIL-P-50884
http://www.dscc.dla.mil/downloads/VQGeneral/FE19Wcurrent.pdf

DSCC Point of Contact List (QPL Program)
http://www.dscc.dla.mil/downloads/VQGeneral/IEQMLQPLPOCcurrent.pdf

Non-Government:

IPC-2221: Generic Standard on Printed Board Design
IPC-2223: Sectional Design Standard for Flexible Printed Boards
IPC-A-600: Acceptability of Printed Boards
IPC-10004x: Master Drawings
J-STD-003: Solderability Test
IPC-TM-650: Test Methods (available online)

These documents can be obtained at:
IPC-Association Connecting Electronics Industries (IPC)
300 Lakeside Drive • Suite 309S
Bannockburn, IL 60015-1249
http://www.ipc.org

GENERAL INFORMATION

INTRODUCTION: This section is intended as a guide to help understand some of the requirements of the specifications and to emphasize some aspects of the DoD Standardization Program that manufacturers must consider when supplying QPL product. MIL-PRF-55110 and MIL-P-50884 are conventional specifications dependent on end item testing to assure compliance. Manufacturers who have established quality systems, process controls, and long term reliability programs are encouraged to participate in the MIL-PRF-31032 Qualified Manufacturers List (QML) program.

REVISIONS AND AMENDMENTS: The manufacturer must determine the specific revision, and when applicable, amendment of the specification required by the customer. Some customers may require past revisions and/or amendments due to higher level contractual requirements. In these cases, the manufacturer must comply with all of the requirements of the applicable revision and amendment. The revision and amendment must be conveyed to the test laboratory for group B testing so the applicable printed board parameters can be verified. Refer to Appendix D of both MIL-PRF-55110 and MIL-P-50884 for additional discussion on previous revisions and amendments.

DESIGN STANDARD: It is important that a manufacturer clearly identify the design standard their customer used for the master drawing before production begins. The design standard is not only used for coupon layout and configuration, but also for printed board parameters when the specification or drawing does not specify a value (such as plating thickness, annular ring, etc.). This design standard must also be conveyed to the test laboratory performing group B inspection so those parameters can be accurately verified. If the customer does not specify a particular design standard, use the default design standard listed in the specification.

"AS SPECIFIED": When the phrase "as specified" is used in MIL-PRF-55110 or MIL-P-50884 without further reference, it means the value for the particular parameter will be found on the master drawing. Both specifications identify default design standards to use when these parameters are not listed in the master drawing. This approach gives the designer maximum flexibility to alter the standard design criteria to accommodate advances in manufacturing capability. It also relieves the designer of the burden of specifying all of the design criteria on the master drawing because the default values are already in the design standard. It is the printed board manufacturer's responsibility to review the printed board procurement documentation, including the master drawing, contract, artwork, purchasing documents, etc., to determine the printed board parameters prior to production.

QUALIFICATION MASTER DRAWING: The qualification test specimens are required to comply with the requirements of MIL-PRF-55110 or MIL-P-50884. These two specifications make reference to the various IPC master drawings for the conductive pattern, hole location, and test coupon design details for the qualification test specimens. The detailed requirements for design, construction, and material of tables 1 and 2 in the IPC master drawings **have been superseded** (see A.4.5.2.1 of MIL-PRF-55110 and MIL-P-50884). The superseding requirements of table 1 (for IPC-B-4x\55110 Boards) and table 2 (for IPC-B-4x\50884 Boards) are addressed in Attachment A for MIL-PRF-55110 and Attachment B for MIL-P-50884 herein.

The master drawing reference must be listed in the correct block on page 4 of this form. Manufacturers may be required to make adjustments to the electronic data or phototools that they procure to use in the construction of qualification test vehicles in order for the test specimens to comply with the master drawing. **If qualification test specimens do not meet the master details drawing specified in Attachment A or B (as applicable), then the qualification test specimens fail** (unless exceptions to the master drawing had previously been authorized by DSCC on this form).

MATERIAL REQUIREMENTS: The printed board materials used must comply with the material requirements specified on the master drawing, contract or order. If the documentation specifies material that can no longer be acquired, such as laminates certified to MIL-P-13949 or MIL-S-13949 (which was cancelled November 30, 1998), the manufacturer must consult their customer to determine alternate base material requirements. To meet the material inspection requirements of MIL-PRF-55110 and MIL-P-50884 the manufacturer must have documentation showing compliance to the customer's material requirements, especially for instances in which base material requirements differ from those actually listed on the master drawing.

QPL TESTING REQUIREMENTS: Because of the dependence on end item testing for MIL-PRF-55110 and MIL-P-50884, manufacturers must pay special attention to the specified tests and assure full compliance to every detail of each test method. All tests specified must be performed as required. It is the manufacturer's responsibility to ensure that all tests are being performed, which may include adding additional test coupons and performing some tests in-process when necessary. As a minimum the manufacturer must retain the following information for each inspection lot:

- Part number and traceability information in accordance with paragraph A.3.9 of both specifications
- Lot size including number of printed boards and number of panels
- Sample size, number passed and number failed for each test (Note: sample sizes may vary from test to test)
- Records of inspection of each test vehicle. Note that all microsection evaluations are performed on thermal stress and as-received microsections

RETENTION REPORTS: Retention reporting periods for each manufacturer are assigned in the DSCC Notification of Qualification letter. Retention reports are due within 60 days of the end of the reporting period to allow the manufacturer to complete group B testing. Retention reporting information must be summarized on DSCC Form 36W . Photocopies of groups B and C data must be submitted with the report. In the event that no production of compliant printed boards occurred during the entire reporting period, the manufacturer shall:

- Confirm that the manufacturer wants to remain on the QPL
- Submit to DSCC a statement that the capabilities are being maintained to manufacture and test QPL printed boards.

GROUP B FAILURES: Test vehicles selected for group B testing represent all production for that month. When a group B failure occurs, the manufacturer must immediately take the following actions:

- Notify DSCC-VQE of the failure.
- Notify the customer that the lot has failed and does not meet the requirements of the specification. A copy of this notice shall be submitted to DSCC-VQE. Product may need to be recalled.
- Discontinue further production of printed boards represented by the failed sample lot until corrective actions for the failure have been approved by DSCC-VQE.
- If more than one lot was produced during a production month, submit test vehicles from the next most complex lot. All other lots represented by the failed lot produced during that month are suspect until group B testing is passed.

INACTIVE FOR NEW DESIGN: MIL-PRF-55110 and MIL-P-50884 are both "inactive for new design". The designers of new systems are encouraged to reference MIL-PRF-31032 instead of using MIL-PRF-55110 or MIL-P-50884. Designers have the flexibility to use MIL-PRF-55110 or MIL-P-50884 if they desire. DSCC-VQE will continue to maintain the Qualified Products Lists (QPL) for MIL-PRF-55110 and MIL-P-50884 to support existing and future contracts.

INSTRUCTIONS FOR PAGE 4, SECTION I

Item 1: Enter the manufacturer's CAGE code. A CAGE code is a five (5) character code that identifies companies doing business with the Federal Government.

You can register at www.ccr.gov/FAQ.aspx or call for assistance at 1-888-227-2423. Non- U.S. companies' CAGE code information can be obtained at: www.ccr.gov/FAQ.aspx#international or call 1-269-961-5757.

Item 2: List the specification to be qualified, including the most current revision and amendment level. This will determine the Attachment A or B notes to be used to produce the qualification test specimens. Paragraph A.4 of MIL-PRF-55110 and MIL-P-50884 contains additional information and instructions.

When the term *master drawing* is used in this form, it includes Attachment A or B of this form, portions of the IPC master drawing, along with the modifications dictated by either MIL-PRF-55110 or MIL-P-50884 and the printed board construction details.

Evaluations are performed to the requirements of Attachment A or B and the patterns defined on the IPC master drawing, not to the electronic data representing the patterns of the IPC master drawings. Unless otherwise requested by the manufacturer and approved by DSCC, the requirements of Attachment A or B, and MIL-PRF-55110 or MIL-P-50884 shall apply.

Note: There may be some discrepancies between the patterns on master drawing IPC-100043 and the electronic data available for purchase. Manufacturers may need to make changes and/or adjustments to the electronic data or phototools that they procure in order for the qualification test specimens to comply with the master drawing defined by Attachment A or B herein. If qualification test specimens do not meet the master drawing specified in this form, then these qualification test specimens shall fail (unless exceptions to the master drawing requirements had previously been authorized by DSCC and are listed under item 15, *Additional Information*).The specifications for printed boards can be found on the DSCC website, or by clicking the appropriate link:

MIL-PRF-55110:
www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-PRF-55110

MIL-P-50884:
www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-P-50884

Item 3: List the manufacturer's name and mailing address. If the plant location has a different address, enter in item 15, Additional Information.

Item 4: List the manufacturer's main point of contact with contact information that includes the phone number (with area code and extension), fax number, and e-mail address.

Item 5: Use of Contract Services:

- ***None:*** Contract services not used, no other information is needed.
- ***Using Contract Service:*** Use of contract services is discussed in paragraph A.4.5.3.3 of the specifications. List the contract service organization (including name, address, contact information, and the service provided) in item 15, Additional Information.
    - If the "PROCESSES" block is checked, the manufacturer's internal process must be qualified without the contracted services prior to qualifying with the contracted service.
    - Contact DSCC for qualification procedure and testing options.
    - Labs performing qualification testing are not contract services.

Item 6: Indicate the type of qualification:

- ***Initial Qualification:*** Manufacturers who are not currently listed on the qualified list for the referenced specification.
- ***Re-qualification:*** Manufacturers currently listed on the qualified list and are re-qualifying their product to maintain this listing.
- ***Process Change:*** Check this item if the manufacturer is changing a process that was used for qualification. For example, the use of a different plating process than initially qualified. Contact DSCC prior to submitting the application for qualification procedure and testing options.

Item 7: Indicate where the CTR portion of qualification testing will be performed, including name, address, and contact information. The laboratory must be a certified laboratory for testing as approved by DSCC. The certified laboratory list is available upon request, and can be found at the following web address:

http://www.dscc.dla.mil/downloads/VQGeneral/IEPWBLABCURRENT.pdf

Item 8: The listed procedures shall be submitted with the DSCC Form 19W. Check the boxes to show these are attached.

- Include only product assurance procedures that have been revised since the last submittal to DSCC-VQE.
- Details regarding the product assurance procedures can be found in paragraph A.4.5.5.2 of each specification.
- The calibration list includes, as a minimum, the equipment type, internal reference ID, the last calibrated date and calibration due date, and the test(s) for which the equipment is used.

Item 9: Indicate the printed board type to be qualified, as defined in 1.2.1 of the specification.

Item 10: Indicate the type of base materials used to produce the qualification test specimens:

- Indicate the rigid base material being used. This should include the specification the material is certified to, revision, and any applicable slash or data sheet numbers.
- Indicate which flexible base material is being used. This includes the specification it is certified to, the specification revision, and any applicable data sheets. Only applicable to MIL-P-50884.

Item 11: Indicate the type (material and/or process) of conductor finish used on the qualification test specimens.

Item 12: Indicate if the manufacturer seeks to qualify an etchback process. A manufacturer will only be qualified for etchback if they qualify this process during qualification. **Note:** If using a contract service to perform this process, refer to the instructions for item 5.

Item 13: Indicate if the qualification test specimens are to be constructed using foil lamination. If so, the peel strength test coupon is required in Zone D for Surface Peel Strength testing (as outlined in the specification) and **surface peel strength testing required for foil lamination qualifications.**

Item 14: Identify the flexibility class (see 1.2.2 of MIL-P-50884) by checking the appropriate box. If qualifying to both, check both boxes.

- **Class A:** Capable of withstanding flexing during installation.
- **Class B:** Capable of withstanding continuous flexing for the number of cycles specified.

Item 15: Note additional information to be communicated to DSCC. This includes requests for exceptions to the master drawing requirements or Attachment A or B, alternate testing instructions (such as for qualification with a contract service or for a process change), or other communications to DSCC.

Item 16: Sign the document before submitting it to DSCC, thereby agreeing to the stated conditions.

DSCC Form 19W [July 2008]

Application/Authorization to Conduct Qualification Testing for MIL-PRF-55110, MIL-P-50884

Superseding DSCC Form 19W [June 2008]

to be completed by the manufacturer	**SECTION I**	*refer to page 3 for instructions*

1. MANUFACTURER'S CAGE CODE:

2. SPECIFICATION (WITH REVISION & AMENDMENT):

3. MANUFACTURER'S NAME AND MAILING ADDRESS:

PLANT LOCATION SAME AS ABOVE? ☐ YES ☐ NO, ADD LOCATION TO ITEM 15

4. POINT OF CONTACT, PHONE, FAX, AND E-MAIL ADDRESS:

5. USE OF CONTRACT SERVICES:
- ☐ NONE
- ☐ USING CONTRACTED SERVICES FOR: (see instructions on page 3)
  - ☐ TESTS
  - ☐ PROCESSES

6. THIS APPLICATION IS FOR:
- ☐ INITIAL QUALIFICATION
- ☐ RE-QUALIFICATION
- ☐ PROCESS CHANGE (see instructions on page 3)

7. QUALIFICATION TESTING (CTR PORTION) WILL BE PERFORMED AT:

Microtek Labs

1435 S. Alec Street

Anaheim, CA 92805-6306

8. THE FOLLOWING PROCEDURES ARE ATTACHED FOR DSCC REVIEW:

PRODUCT ASSURANCE PROCEDURES (SEE A.4.5.5.2 OF SPEC)
- ☐ IN-PROCESS AND GROUP A TESTING PROCEDURES AND CHECKLISTS
- ☐ TEST COUPON QUANTITY, DESIGN, AND PLACEMENT PROCEDURES
- ☐ GROUP B COMPLEXITY AND SELECTION PROCEDURE

ADDITIONAL INFORMATION:
- ☐ LIST OF CALIBRATED TEST EQUIPMENT USED FOR CONFORMANCE INSPECTION

9.BOARD TYPE:	**10. BASE MATERIAL SPECIFICATION(S):**	**11. CONDUCTOR SURFACE FINISH:**	**12. ETCHBACK:** ☐ YES ☐ NO
	a RIGID:		**13. FOIL LAMINATION:** ☐ YES ☐ NO (surface peel strength test required if marked yes)
	b. FLEXIBLE:		**14. FLEX CLASS (MIL-P-50884 ONLY):** ☐ CLASS A ☐ CLASS B

15. ADDITIONAL INFORMATION:

NOTE: ATTACHMENT A OR B MASTER DRAWING REPLACEMENT REQUIREMENTS APPLY

16. MANUFACTURER REPRESENTATIVE: The undersigned certifies that they have read all sections and instructions prior to submitting this form. The undersigned certifies that the information submitted to DSCC in this application is correct and the test vehicles will be built solely at the plant(s) identified herein. The undersigned agrees to the conditions of the applicable Department of Defense publication, "SD-6: Provisions Governing Qualification", and to the conditions of this form. When granted, authorization to complete testing is valid for one year from the date approved. All test reports shall be prepared in accordance with this form and SD-6.

NAME:	**SIGNATURE:**
TITLE:	**DATE:**

to be completed by DSCC-VQE	**SECTION II**	*to be completed by DSCC-VQE*

DSCC LETTER NUMBER:	**DATE APPROVED:**
TEST REPORT NUMBER:	
PRINTED BOARD TYPE & BASE MATERIAL TYPE:	
IN REPLY REFER TO :	**CHIEF, DSCC-VQE** **SOURCING AND QUALIFICATIONS UNIT**

to be completed by test laboratory	**SECTION III**	*to be completed by test laboratory*

TEST LABORATORY NAME AND ADDRESS:

Microtek Labs

1435 S. Alec Street

Anaheim, CA 92805-6306

POINT OF CONTACT, PHONE, FAX, AND E-MAIL ADDRESS:

Mr. Russ Shepard

P: 714-999-1616

E: russ@thetestlab.com

TEST SPECIMEN DESCRIPTION:

PRINTED BOARD TYPE:

BASE MATERIAL TYPE AND SPECIFICATION:

ETCHBACK (Y/N):

CONDUCTOR FINISH:

FOIL LAMINATION (Y/N):

TEST RESULTS – CHECK AS APPLICABLE:

- ☐ **SAMPLES WERE NOT PRE-SCREENED PRIOR TO TESTING**
- ☐ **COMPLIES WITH SPECIFICATION**
- ☐ **COMPLIES WITH MASTER DRAWING & ATTACHMENT A OR B**
- ☐ **COMPLIES WITH INFORMATION PROVIDED IN THIS FORM**
- ☐ **IF NOT, EXPLAIN RESULTS IN REMARKS SECTION BELOW**

REMARKS:

TEST LABORATORY

The test laboratory identified above agrees to the conditions as stated in Chapter 4 of SD-6, "Provisions Governing Qualification", and to provisions in the DSCC Form 19W. Further, the undersigned certifies that all tests and items included in this report were performed in full compliance with all provisions of the Department of Defense specification using test facilities which have been inspected and found suitable by DSCC.

NAME:

(LABORATORY REPRESENTATIVE)

TITLE:

SIGNATURE:

DATE:

REQUIREMENTS FOR THE QUALIFICATION TEST REPORT

The original test report, prepared in accordance with SD-6, "Provisions Governing Qualification" format, properly collated, and fastened with all pages numbered must be sent to DSCC. See DSCC letter number DSCC-VQE-07-011991 (available upon request, send email to 5998.Qualifications@dla.mil) for more information. The test report shall include the following:

- Cover Sheet (including manufacturer's name, location and CAGE code, material classification and board type, and specification with revision and amendment level).
- A unique test report number issued by DSCC (listed on page 4, section II).
- Pages 4 & 5 of Approved DSCC Form 19W.
- List of the printed board materials used and the certification of conformance for the materials to the applicable specification.
- Compilation of test data, including actual readings of time, temperature, electrical, and mechanical measurements shown in the original test data. If calculations are required, the formulas must be indicated.
- Photographs at a minimum of 50X magnification of the following microsections:
  - As Received
  - Thermal Stress
  - Thermal Shock
  - Rework Simulation
- Photographs of failures at a minimum of 50 X magnifications or as appropriate magnification to show the defect.
- Test vehicles submitted and tested for the CTR portion of testing.
- Manufacturer's test vehicles and test data for the MTR portion of testing.

NOTES FOR THE QUALIFICATION REPORT

- Erasures or white-out of test data will not be accepted. Corrections must be made by "line out" with a single line and the correct entry must be made immediately adjacent to the "lined out" entry.
- All required test vehicles shall be furnished with the test report at no charge to the Government. Test vehicles will not be returned to the manufacturer, unless authorized by DSCC.
- When testing is performed in more than one test location, the manufacturer of the product will be responsible for combining the results of the testing into one composite report for each product tested.
- Unless otherwise specified, the resolution of measurement devices and test equipment shall be at least a factor of 10 better than the limits or tolerances of a value to be determined. Note that some specification requirements are actually percentages of the specified parameter. For example, for an allowed 20% reduction to an annular ring requirement of 0.002", measurements must be recorded to four (4) decimal places.

ATTACHMENT A: MASTER DRAWING REPLACEMENT REQUIREMENTS, MIL-PRF-55110 QUALIFICATIONS ONLY

1. **General.** The requirements of this attachment supersede those listed in Table 1 of IPC-100041, IPC-100042, IPC-100043, and IPC-100044. The qualification test specimens shall be fabricated to the following requirements shall comply with the end item requirements of MIL-PRF-55110.

2. **Deviations.** The qualification test specimens fabricated to this attachment shall be of the design and construction specified herein. For the purposes of this master drawing, when the term "specified" is used without additional reference to a specific location or document, the intended reference shall be to blocks 9 through 15 of section I of the qualifying approved DSCC Form 19W. Any deviation from the material, design, and construction details specified herein not approved by the DSCC, will result in the printed board being deemed noncompliant with this master drawing.

3. **Conductor patterns and hole locations.** Patterns and holes in Zone D are required for qualification. Tooling holes, spots for optional automatic microsectioning holes, microsections aids, and alignment bars on all A, B, and AB test coupons are optional and do not need to be present on finished qualification test specimen.

   a. Type 1 printed boards shall use the patterns defined by figure 1-1 of IPC-100041 and the location of all holes shall be defined on IPC-100001.

   b. Type 2 printed boards shall use the patterns defined by figures 1-1 and 1-2 of IPC-100042 and the location of all holes shall be defined on IPC-100001.

   c. Type 3 printed boards constructed of thermosetting base materials shall use the patterns defined by figures 1-1 through 1-10 of IPC-100043 and the location of all holes shall be defined on IPC-100001.

   d. Type 3 printed boards constructed of thermoplastic base materials shall use the patterns defined by figures 1-1 through 1-4 of IPC-100044 and the location of all holes shall be defined on IPC-100001.

4. **Material requirements and conductor thickness.** All materials shall be in accordance with the material specifications listed in item 10 of form 19W. Unless otherwise specified, metal clad base material shall have a minimum starting foil of 0.5 oz/Ft^2 or greater. The minimum conductor thickness shall be .0010 in. (0.025 mm) for all layers. Unless otherwise specified, the prepreg used in the manufacturing of the qualification test specimen shall be of the same resin system and reinforcement as the copper clad base material. Any changes to the material specifications shell be noted in items 10 and 15 on page 4 of this form, DSCC 19W.

5. **Hole plating.** Plated-through holes shall contain a minimum of .001 in. (0.025 mm) of copper. Type 1 qualification test specimens do not contain plated through holes.

6. **Conductor surface finish.** Conductor surface finishes shall exhibit complete coverage and meet the solderability requirement of MIL-PRF-55110. Unless otherwise specified, the conductor surface finish thickness shall be in accordance with IPC-2221.

7. **Board construction, overall printed board, and dielectric thickness.**

   a. Type 1. The printed board thickness when measured across all conductor surfaces including plating shall be .060 to .072 in. (1.5 to 1.8 mm).

   b. Type 2 (thermosetting base materials). The printed board thickness when measured across all conductor surfaces including plating shall be .060 to .072 in. (1.5 to 1.8 mm).

   c. Type 2 (thermoplastic base materials). The printed board thickness when measured across all conductor surfaces including plating shall be .030 to .036 in. (0.76 to 0.90 mm).

   d. Type 3 (thermosetting base materials). The printed board thickness when measured across all conductor surfaces including plating shall be .090 to .110 in. (2.25 to 2.75 mm). The minimum dielectric thickness between layers shall be .0060 in. (0.15 mm).

   e. Type 3 (thermoplastic base materials). The printed board thickness when measured across all conductor surfaces including plating shall be .040 to .060 in. (1.02 to 1.52 mm). The minimum dielectric thickness between layers shall be .0060 in. (0.15 mm).

8. **Overall length and width.** Unless otherwise specified, the partial qualification test specimen (zones A, B, and C, minus the Zone D test coupons) shall be inspected for overall length and width. The overall printed board length is 12.80 ±.02 in. (325.12 ±0.51 mm). The overall printed board width is 5.750 ±.010 in. (146.05 ±0.254 mm).

9. **Solder resist.** Solder resist is not permitted in Zones A, B, and C.

ATTACHMENT A continued

10. **Hole cleaning (desmear/etchback).** When etchback is to be qualified, there shall be no evidence of negative etchback.

11. **Hole, land size, minimum annular ring, and conductor width.** The requirements for hole size, land size, minimum annular ring, and conductor width shall be in accordance with table A-1.

Table A-1. Hole, land size, minimum annular ring, and conductor width.

Zone	Hole and land size		Minimum annular ring		Conductor width	
	Land size	Hole size tolerance 2/	External	Internal	Nominal	Tolerance
A	.080 (2.0)	.040 to .048 (1.0 to 1.2)	.008 (0.2)	.004 (0.1)	.025 (0.6)	.022 to .027 (0.55 to 0.68)
B	.070 (1.75)	.028 to .036 (0.71 to 0.91)	.010 (0.25)	.006 (0.15)	.010 (0.25)	.007 to .012 (0.175 to 0.3)
C	.060 (1.5)	.020 to .028 (0.51 to 0.71)	.012 (0.3)	.008 (0.2)	.005 (0.125)	.002 to .007 (0.05 to 0.175)

1/ Dimensions are in inches. Millimeters, in parenthesis, are given for information only
2/ Unsupported holes for type 1. Plated-through holes for type 2 and type 3

12. **Manufacturer testing.** The destructive portion of the manufacturer test routine (MTR) shall be performed on test coupons in Zone D.

13. **Test coupons in Zone D.** Test coupons AB-7 and AB-8 shall comply with Zone A requirements as listed in Table A-1. Test coupons AB-9, AB-10, AB-11, and AB-12 shall comply with Zone B as listed in Table A-1. Test coupons AB-13 and AB-14 shall comply with Zone C requirements as listed in Table A-1.

14. **Peel strength coupons.** To qualify foil lamination process, peel strength coupons shall be added to Zone D. One P test coupon shall be added on each side of the panel to each foil outer layer. A description of the test requirements and coupon can be found in paragraph A.4.8.4.7 and paragraph A.4.8.4.7.1 of MIL-PRF-55110.

15. **Product identification marking.** Marking of the serial number and lot date code shall be in ink, near the center of the H-2 test coupon on layer 1. The direction of the marking shall be in the same direction as the etched characters on layer 1. The ink shall be in accordance with commercial item description A-A-56032, type II, color black or white (PIN AA56032-IIBLK or AA56032-IIWHT), or equivalent.

16. **Bow and twist.** For printed boards fabricated using thermosetting resin base materials, the limits for bow and twist shall be 1.0 percent. Bow and twist limits are not applicable for printed boards fabricated from thermoplastic resin base materials.

17. **Ionic contamination of completed board.** The level of ionic contamination shall not exceed an equivalent of 7.545 micrograms/square in. (1.17 micrograms/square centimeter) of sodium chloride.

18. **Electrical test.** Test coupons listed in Table A-II of the MIL-PRF-55110 shall be tested for continuity and isolation. For manual testing, the test voltage for continuity shall be 25 to 50 volts (DC) and the test current for isolation shall be from .25 to 1.0 ampere. For automated test equipment, the default parameters may be used. The test voltages and currents used shall be recorded and retained.

19. **Packaging and shipping information.** For all qualification test specimens in the lot, the manufacturer shall include all information listed on page 1 of this form, under the heading “What to Submit to the Laboratory.”

ATTACHMENT B: MASTER DRAWING REPLACEMENT REQUIREMENTS, MIL-P-50884 QUALIFICATIONS ONLY

1. **General.** The requirements of this attachment supersede those listed in Table 1 of IPC-100041, IPC-100042, IPC-100043, and IPC-100044. The qualification test specimens shall be fabricated to the following requirements shall comply with the end item requirements of MIL-P-50884.

2. **Deviations.** The qualification test specimens fabricated to this attachment shall be of the design and construction specified herein. For the purposes of this master drawing, when the term "specified" is used without additional reference to a specific location or document, the intended reference shall be to blocks 9 through 15 of section I of the qualifying approved DSCC Form 19W. Any deviation from the material, design, and construction details specified herein not approved by the DSCC, will result in the qualification test specimen deemed noncompliant with this master drawing.

3. **Conductor patterns and hole locations.** Patterns and holes in Zone D are required for qualification. Tooling holes, spots for optional automatic microsectioning holes, microsections aids, and alignment bars on all A, B, and AB test coupons are optional and do not need to be present on finished qualification test specimen.

   a. Type 1 printed boards shall use the patterns defined by figure 1-1 of IPC-100041 and the drilled holes shall be defined on IPC-100001.

   b. Type 2 printed boards shall use the patterns defined by figures 1-1 and 1-2 of IPC-100042 and the location of all holes shall be defined on IPC-100001.

   c. Type 3 printed boards shall use the patterns defined by figures 1-1 through 1-10 of IPC-100043 and the location of all holes shall be defined on IPC-100001.

   d. Type 4 printed boards shall use the patterns defined by figures 1-1 through 1-10 of IPC-100043 and the location of all holes shall be defined on IPC-100001.

   e. Type 5 printed boards shall use the patterns defined by figures 1-1 through 1-4 of IPC-100044 and the location of all holes shall be defined on IPC-100001.

4. **Material requirements and conductor thickness.** All materials shall be in accordance with the material specifications listed in item 10 of form 19W. Unless otherwise specified, metal clad base material shall have a minimum starting foil of 0.5 oz/Ft^2 or greater. The minimum conductor thickness shall be .0010 in. (0.025 mm) for all layers. Unless otherwise specified, the prepreg used in the manufacturing of the qualification test specimen shall be of the same resin system and reinforcement as the copper clad base material. Any changes to the material specifications shell be noted in items 10 and 15 on page 4 of this form, DSCC 19W.

5. **Hole plating.** Plated-through holes shall contain a minimum of .0014 in. (0.035 mm) of copper. Types 1 and 5 qualification test specimens do not contain plated through holes.

6. **Conductor surface finish.** Conductor surface finishes shall exhibit complete coverage and meet the solderability requirement of MIL-P-50884. Unless otherwise specified, the conductor surface finish thickness shall be in accordance with IPC-2221.

7. **Board construction, overall printed board, and dielectric thickness.** The center section of the qualification test specimen (coupons H-1, H-2, and H-3) shall be permitted to flex. All material of the flexible area of the board defined by the four flex demarcation triangles (◣) shall have a coverlayer per the material specifications specified. Test coupons “C” in Zones A, B, and C are to be left uncovered (i.e. no coverlayer).

   a. Type 1. The total thickness of the printed board when measured across all conductor surfaces, dielectric, coverlayer, etc. shall be .0040 to .0080 in. (0.1 to 0.2 mm).

   b. Type 2. Type 2 printed boards shall be double side clad base material with a stiffener over the rigid portions of the specimen (coupons A, B, C, D, and E) and zone D. The total thickness of the printed board when measured across all conductor surfaces including plating or stiffeners shall be .030 to .060 in. (0.76 to 1.5 mm). Minimum dielectric thickness shall be .0010 in. (0.025 mm).

   c. Types 3 and 4. Type 3 printed boards shall have a stiffener attached to layer 10; type 4 printed boards shall have layers 1 and 10 made of rigid clad base material in accordance with the material specification specified. The total thickness of the printed board when measured across all conductor surfaces including plating or stiffeners shall be .080 to .110 in. (2.0 to 2.8 mm). Coverlayers shall not be bonded together in the flex area. Minimum dielectric thickness shall be .0010 in. (0.025 mm) in the flexible area and .0015 in. (0.038 mm) in the rigid areas of type 4 boards.

   d. Type 5: Type 5 printed board shall either have a stiffener attached to layer 4 or shall have layers 1 and 4 made of rigid metal clad base material in accordance with the material specification specified. The total thickness of the printed board when measured across all conductor surfaces including plating or stiffeners shall be .060 to .080 in. (1.5 to 2.0 mm). Minimum dielectric thickness shall be .0010 in. (0.025 mm) in flexible areas and .0015 in. (0.038 mm) in the rigid areas of type 5 The qualification test specimens.

ATTACHMENT B continued

8. **Overall length and width.** Unless otherwise specified, the partial qualification test specimen (zones A, B, and C, minus the Zone D test coupons) shall be inspected for overall length and width. The overall printed board length is 12.80 ±.02 in. (325.12 ±0.51 mm). The overall printed board width is 5.750 ±.010 in. (146.05 ±0.254 mm).

9. **Solder resist.** Solder resist is not permitted in Zones A, B, and C.

10. **Hole cleaning (desmear/etchback).** When etchback is to be qualified, there shall be no evidence of negative etchback.

11. **Hole size, land size, minimum annular ring, and conductor width.** The requirements for hole size, land size, minimum annular ring, and conductor width shall be in accordance with table B-1.

Table B-1. Hole, land size, minimum annular ring, and conductor width. 1/

Zone	Hole and land size		Minimum annular ring		Conductor width	
	Land size	Hole size tolerance 2/	External	Internal	Nominal	Tolerance
A	.080 (2.0)	.040 to .048 (1.0 to 1.2)	.008 (0.2)	.004 (0.1)	.025 (0.6)	.022 to .027 (0.55 to 0.68)
B	.070 (1.75)	.028 to .036 (0.71 to 0.91)	.010 (0.25)	.006 (0.15)	.010 (0.25)	.007 to .012 (0.175 to 0.3)
C	.060 (1.5)	.020 to .028 (0.51 to 0.71)	.012 (0.3)	.008 (0.2)	.005 (0.125)	.002 to .007 (0.05 to 0.175)

1/ Dimensions are in inches. Millimeters, in parenthesis, are given for information only

2/ Unsupported holes for types 1 and 5. Plated through holes for types 2, 3 and 4

12. **Manufacturer testing.** The destructive portion of the manufacturer test routine (MTR) shall be performed on test coupons in Zone D.

13. **Test coupons in Zone D.** Test coupons AB-7 and AB-8 shall comply with Zone A requirements as listed in Table A-1. Test coupons AB-9, AB-10, AB-11, and AB-12 shall comply with Zone B as listed in Table A-1. Test coupons AB-13 and AB-14 shall comply with Zone C requirements as listed in Table A-1.

14. **Peel strength coupons.** To qualify foil lamination process, peel strength coupons shall be added to Zone D. One P test coupon shall be added on each side of the panel to each foil outer layer. One P coupon shall be added on each side of the panel to each foil outer layer. A description of the test requirements and coupon can be found in paragraph A.4.8.4.9 and A.4.8.4.9.1 of MIL-P-50884, ensuring that a minimum coupon width of .5 in. (12.7 mm) is centered on the copper pattern for proper testing.

15. **Product identification marking.** Marking of the serial number and lot date code shall be in ink, near the center of the H-2 test coupon on layer 1. The direction of the marking shall be in the same direction as the etched characters on layer 1. The ink shall be in accordance with commercial item description A-A-56032, type II, color black or white (PIN AA56032-IIBLK or AA56032-IIWHT), or equivalent.

16. **Bow and twist.** For printed boards fabricated using thermosetting resin base materials, the limits for bow and twist shall be 1.0 percent. Bow and twist limits are not applicable for printed boards fabricated from thermoplastic resin base materials.

17. **Ionic contamination of completed board.** The level of ionic contamination shall not exceed an equivalent of 7.545 micrograms/square inch (1.17 micrograms/square centimeter) of sodium chloride.

18. **Electrical test.** Test coupons listed in Table A-II of MIL-P-50884 shall be tested for continuity and isolation. For manual testing, the test voltage for continuity shall be 25 to 50 volts (DC) and the test current for isolation shall be from .25 to 1.0 ampere. For automated test equipment, the default parameters may be used. The test voltages and currents used shall be recorded and retained.

19. **Packaging and shipping information.** For all qualification test specimens in the lot, the manufacturer shall include all information listed on page 1 of this form, under the heading “What to Submit to the Laboratory.”