| APPLICATION | | | | A original issue released | REVISIONS | | | |
|---|---|---|---|---|---|---|---|---|
| NEXT ASSY | | QTY | DASH | LTR | DESCRIPTION | BY | DATE | APPD |
| | | | | R | REVISED PER ECO [5A102] | CF | 05/15/95 | BPS |
| | | | | S | REVISED PER ECO [5N130] | CF | 12/15/95 | BPS |
| | | | | T | REVISED PER ECO [5N157] | CF | 12/15/95 | BPS |
| | | | | U | REVISED PER ECO (8S128) | CF | 10/09/98 | BPS |
| | | | | V | REVISED PER ECO (00G113) | CF | 08/25/00 | ES |
| | | | | W | REVISED PER ECO (00D126)<br>TRANSFERRED TO ELECTRONIC MEDIA<br>COVER SHEET ADDED. PAGES RENUMBERED.<br>REVISION BARS ( IF ANY) REMAIN FROM<br>PREVIOUS REVISION. | VJS | 03/12/01 | VJS |
| | | | | X | REVISED PER ECO (01M113) | CLF | 09/14/01 | GA |
| | | | | Y | REVISED PER ECO [0203108] | CLF | 05/01/02 | ES |
| | | | | AA | Revised Per ECO0302113 | GA | 07/30/03 | GA |
| | | | | AB | Revised Per ECO0406117 | GA | 07/26/04 | GA |
| | | | | AC | Revised Per ECO [10003303] | CLF | 11/SEPT/01 | BPS |
| | | | | AD | Revised Per ECO [10003676] | CLF | 2012/JUL/23 | RH |
| | | | | AE | Revised Per ECO [10004703] | CLF | 2014/JUN/11 | BPS |
| | | | | AF | Revised Per ECO [10005092] | CLF | 2015/JAN/23 | BPS |
| | | | | AG | Revised Per ECO [10005624] | CLF | 2016/MAY/24 | BPS |

Names and initials on this page are for reference only. See EDMS for approvals.

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| | | |
| | FE- | |
| FINAL QTY | FIRST USED ON | DASH |

LEVEL III



CONTRACT NO.

**FREQUENCY ELECTRONICS, INC**
55 CHARLES LINDBERGH BLVD, MITCHEL FIELD, NY 11553

| | | | | |
|---|---|---|---|---|
| DRAWN BY | L. NEER | DATE | 12/7/82 | |
| DSGN / ENGRD | | DATE | | |
| CHKD BY | E. Stocks | DATE | 04/26/02 | |
| DSGN APPD | | DATE | | |
| PROJ APPD | S. SEIFER | DATE | 12/8/82 | |

MATL | TOLERANCES | FRACTION ± | 2 PLACE DECIMAL ± | FINISH | 3 PLACE DECIMAL ± | ANGLES

PURCHASE DOCUMENT QUALITY REQUIREMENTS

| CODE IDENT NO. | SIZE | DRAWING NO. | REV |
|---|---|---|---|
| 14844 | A | 38100-INS | AG |

SCALE | DO NOT SCALE DRAWING | SHEET 1 OF 14

# PURCHASE DOCUMENT QUALITY REQUIREMENTS

## 1.0 PURPOSE.

To assure that the proper program quality requirements are included in the preparation of the Purchase Order.

## 2.0 PROCEDURE.

### 2.1 Requistioner.

In completing the purchase requisition, indicate the required “Q” clauses (Attachment 1). The requistioner may use the FEI Purchase Requisition Form of FEI Form A14228/9FOR “Bill of Materials”.

### 2.2 Purchasing.

If during the negotiations there is a problem with one of the Q clauses, contact the Requistioner and Quality Assurance to resolve the problem.

### 2.3 Quality Assurance.

Assure that the Quality Requirements described on the Purchase Order are met during incoming inspection.

**ATTTACHMENT 1**

**Q CLAUSES**

**PROCURMENT QUALITY REQUIREMENTS**

This document established the Quality Assurance requirements (Q clauses), which are applicable as specified on the procurement document.

☐ Q.1.0 CERTIFICATE OF COMPLIANCE

Documents covering parts, materials, and/or processes delivered under this order shall include a certification reading substantially as follows: Parts, Materials, and/or Processes furnished on this order have been manufactured and/or processed in accordance with all applicable specifications and objective evidence of Conformance is on file and available to FEI upon request.

☐ Q.1.1 ESD

All components classified as ESD sensitive per MIL-STD-1686 and MIL-HDBK-263 will be handled, stored and packaged in accordance with the requirements of those specifications. All such ESD sensitive components will be delivered to FEI in a package with a conductive material or anti-static material with an external conductive field shielding barrier. Component containers will be marked and labeled with ESD warning symbols.

☐ Q.2.0 FEI SOURCE SURVEILLANCE

FEI has the right to perform inspection at Seller's facilities, or those of Seller's subcontractors or suppliers with prior coordination with Seller during the period of manufacture, inspection prior to shipment, and final inspection and acceptance at FEI's facility, unless otherwise specified on the Procurement Document.

☐ Q.2.1 ASSEMBLY/TEST TRAVELER WITH MILESTONE DELIVERY DATES

Vendor shall supply an Assembly/Test Traveler indicating Target dates for completion of the specified Q clauses Q4.0-Q60.0 specified herein as required on the Purchase Order. The Traveler shall be provided within 14 days of the vendor order confirmation.

☐ Q3.01 SOURCE INSPECTION

FEI plans to perform inspection at the Seller's facility. The Seller shall provide reasonable inspection/test facilities for the FEI representative to verify contract conformance. The Seller shall give FEI as much advance notification as possible that an inspection is required (a tentative schedule at least two weeks in advance is desired with confirmation during the week prior to inspection). FEI cannot guarantee compliance with the supplier's desired schedule without adequate advance notification. As a minimum, notify FEI (516-794-4500) not less than five (5) days prior to the need for Buyer inspection/test.

FEI reserves the right to inspect at Seller's facility and at Seller's source those items not manufactured within Seller's facilities.

CSI will be required as follows unless waived by FEI.

☐ A. Prior to encapsulation of capping.

☐ B. Prior to cleaning.

☐ C. Prior to plating.

☐ D. Prior to assembly close-up.

☐ E. At final electrical test (ambient).

☐ F. Prior to lay-up.

☐ G. At environmental/qualification test.

☐ H. Just prior to shipment (Final Source)

☐ I. As specified on the Purchase Order.

☐ Q3.02 Government Source Inspection is required by the Seller's cognizant Government Inspection Activity. Upon receipt of this order contact the agency providing coverage and forward a copy of this order to them. The Seller will provide the GSI with necessary help in planning, documentation, facilities, and other assistance as may be required.

☐ Q.4.0 TEST DATA

The Seller shall submit with each shipment a test report for the delivered items. The report shall show evidence of the Seller's inspection and verification of conformance to the test specification referenced on the FEI Purchase Order. As a minimum the following information shall be included in the test report:

A. FEI Purchase Order
B. Part Number (s), Revision Letter (s)
C. Nomenclature
D. Test Specification
E. Type of Test Performed and Test Method
F. Lot Numbers, Serial Numbers, or Date Codes of Items Tested
G. Characteristics/Parameters Inspected and/or Tested
H. Inspection/Test Data
I. Total Quantity Tested, Quantity Accepted and Quantity Rejected for each Characteristic.
J. Date of Inspection/Test
K. Signature/Stamp of Seller's Test Representative
L. Any Codes, Keys or other Information Necessary to Interpret Seller's Data
M. The Results of all Evaluation Required by FEI Source Control Drawings (SCD's)
N. Other Information Required by the Purchase Document (s).

☐ Q.4.01

The seller shall keep on file a record of all inspection and test performed on the subject purchase order. These records will be made available to FEI upon request and shall be maintained for a period of 7 years unless specified otherwise.

## TRACEABILITY

☐ Q5.01 The vendor shall identify the manufacturer, location of manufacture, lot number, and single lot date code for each lot furnished under the procurement.

☐ Q5.02 All semiconductors and integrated circuits supplied must be traceable to a single diffusion lot.

☐ Q5.03 Traceability of all material, components, and parts used to manufacture and the manufacturer's lot/control number is required.

☐ Q5.04 All semiconductors and integrated circuits supplied must be traceable to a single wafer.

☐ Q5.05 All resistors, Inductors, or capacitors supplied must be from a single lot date code.

## ELEMENT EVALUATION, "Q" CLAUSES Q6.0 THROUGH Q15.0 SHALL BE PERFORMED TO THE APPLICABLE PARAGRAPHS AND TABLES FOR THE REVISION OF MIL-PRF-38534 IN EFFECT AT THE TIME OF THE PURCHASE ORDER

## MICROCIRCUIT AND SEMI CONDUCTOR DICE

☐ Q6.0 100% electrical die testing per MIL-PRF-38534.

## CLASS H

☐ Q7.0 Class H sample evaluation for each dice lot per MIL-PRF-38534.
☐ Q7.01 100% visual inspection per MIL-PRF-38534.
☐ Q7.02 Internal visual per MIL-PRF-38534.
☐ Q7.03 Final electrical per MIL-PRF-38534.
☐ Q7.04 Wire bond evaluation per MIL-PRF-38534.
☐ Q7.05 All die to be homogenous.
☐ Q7.06 Electrical specification to be per MIL-Spec slash sheet.
☐ Q7.07 Electrical specification to be per the Manufacturers data sheet.

## CLASS K

- ☐ Q8.0 Class K sample evaluation for each dice lot per MIL-PRF-38534 (Includes Q2.1 above and Q8.0A to Q8.12 below).
- ☐ Q8.0A Class K Wafer Probe (Electrical) per MIL-PRF-38534.
- ☐ Q8.0B Class K Dice (Saw Cut) Visual Inspection per MIL-PRF-38534.
- ☐ Q8.0C Class K Sample evaluation for each dice lot per MIL-PRF-38534 (Q8.01 to Q8.12).
- ☐ Q8.01 100% visual inspection per MIL-PRF-38534.
- ☐ Q8.02 Stabilization bake as required by Vendor.
- ☐ Q8.03 Temperature cycling per MIL-PRF-38534.
- ☐ Q8.04 Mechanical shock per MIL-PRF-38534 or Q8.05.
- ☐ Q8.05 Constant acceleration per MIL-PRF-38534 or Q8.04.
- ☐ Q8.06 Interim electrical per MIL-PRF-38534.
- ☐ Q8.07 Burn-in per MIL-PRF-38534, Semiconductor and Microcircuit Die shall be 240hrs min at Tc>125C and Tj>140C unless specified otherwise that Tjmax<150C.
- ☐ Q8.08 Post burn-in electrical per MIL-PRF-38534 .
- ☐ Q8.09 Steady state life per MIL-PRF-38534. Semiconductor and Microcircuit Die shall be 1000 hrs min at Tc>125C and Tj>140C unless specified otherwise that Tjmax<150C or 500hrs min at Tc>150C and Tj>165C unless specified otherwise that Tjmax<175C.
- ☐ Q8.10 Final electrical per MIL-PRF-38534.
- ☐ Q8.11 Wire bond evaluation per MIL-PRF-38534.
- ☐ Q8.12 Scanning Electron Microscope (SEM) per MIL-PRF-38534. If not required, vendor shall state rational on C of C (ie not step over oxide, etc).
- ☐ Q8.13 Radiation per MIL-PRF-38534. Level and Performance as specified by the Purchase Order (Partslist).
- ☐ Q8.14 Dose rate and Latch-up per MIL-PRF-38534. Level and Performance as specified by the Purchase Order (Partslist).
- ☐ Q8.15 Total Dose per MIL-PRF-38534. Level and Performance as specified by the Purchase Order (Partslist).
- ☐ Q8.16 Neutron irradiation per MIL-PRF-38534. Level and Performance as specified by the Purchase Order (Partslist).

☐ Q8.17 Vendor to ship 12 die to FEI from the same lot after successful completion of SEM.

☐ Q8.18 Vendor to ship 12 die to FEI from the same lot after successful completion of Visual inspection.

☐ Q8.19 All die to be homogenous.

☐ Q8.20 Electrical specification to be per MIL-Spec slash sheet.

☐ Q8.21 Electrical specification to be per the Manufacturers data sheet.

## PASSIVE ELEMENTS

☐ Q9.0 100% electrical testing per MIL-PRF-38534.

☐ Q10.0 100% visual inspection per MIL-PRF-38534.

## CLASS H

☐ Q11.0 Class H sample visual inspection per MIL-PRF-38534.

☐ Q11.01 Class H sample evaluation for each inspection lot per MIL-PRF-38534.

☐ Q11.02 Perform Low Voltage Humidity Testing (LVH) per MIL-PRF-123 for ceramic capacitors.

☐ Q11.03 Perform 100% Temperature Cycle and Voltage Conditioning per MIL-PRF-123 for ceramic capacitors.

☐ Q11.04 100% Voltage Conditioning per MIL-PRF-55681 for ceramic capacitors.

☐ Q11.05 Supplier shall guarantee that parts will meet the Destructive Physical Analysis requirements of RS-469.

☐ Q11.06 Destructive Physical Analysis is required per MIL-STD-1580. Sample size to be specified.

## CLASS K

- ☐ Q12.0 100% electrical testing per MIL-PRF-38534.
- ☐ Q12.01 Class K sample evaluation for each inspection lot per MIL-PRF-38534.
- ☐ Q12.02 Wire bond evaluation per MIL-PRF-38534.
- ☐ Q12.03 Stabilization bake per MIL-PRF-38534.
- ☐ Q12.04 Temperature cycling per MIL-PRF-38534.
- ☐ Q12.05 Mechanical shock per MIL-PRF-38534.
- ☐ Q12.06 Constant acceleration per MIL-PRF-38534.
- ☐ Q12.07 Voltage conditioning or aging (capacitors) per MIL-PRF-38534.
- ☐ Q12.08 Electrical per MIL-PRF-38534.

## SAW ELEMENT EVALUATION

- ☐ Q13.0 Surface Acoustic Wave element evaluation per MIL-PRF-38534.

## PACKAGE EVALUATION REQUIREMENTS

- ☐ Q14.0 Package evaluation per MIL-PRF-38534.
- ☐ Q14.01 Physical dimensions per MIL-PRF-38534.
- ☐ Q14.02 Solderability per MIL-PRF-38534.
- ☐ Q14.03 Thermal shock per MIL-PRF-38534.
- ☐ Q14.04 High temperature bake per MIL-PRF-38534.

- ☐ Q14.05 Lead integrity per MIL-PRF-38534.
- ☐ Q14.06 Seal per MIL-PRF-38534.
- ☐ Q14.07 Metal package isolation per MIL-PRF-38534.
- ☐ Q14.08 Deleted.
- ☐ Q14.09 Salt atmosphere per MIL-PRF-38534.

## SUBSTRATE EVALUATION REQUIREMENTS

- ☐ Q15.0 Substrate evaluation per MIL-PRF-38534.

## ADHESIVE EVALUATION

- ☐ Q16.0 Polymeric Adhesives shall be tested in accordance with MIL-STD-883, M5011.

## GENERAL

- ☐ Q17.0 CANNED SAMPLES will be supplied by the seller to FEI. The quantity will be listed on the Purchase Order.
- ☐ Q18.0 MIL-PRF-55681 ELECTRICAL TESTING is required.
- ☐ Q19.0 DPA TEST RESULTS as required by the purchase documents will be included as part of the data package.
- ☐ Q20.0 GEOMETRIES OF SEMICONDUCTORS AND MICROCIRCUITS will be provided by the seller.
- ☐ Q20.01 The specified tests must be performed at a Defense Electronics Supply Center (D.E.S.C.) approved Laboratory.

## PHOTOGRAPHS

- ☐ Q21.0 An 8 x 10 color photograph of a single item of the lot delivered will be included with the shipment.
- ☐ Q21.1 An 8 x 10 color photograph of every item delivered will be included with the shipment.

## SAMPLES

- ☐ Q22.0 Evaluation samples will be delivered to FEI after completion of required Non Destruction Testing.
- ☐ Q23.0 DPA samples required by the purchase order will be marked and packaged separately. They may be shipped at the same time or before the lot. Subsequent shipments from the same lot where DPA samples have been provided previously will reference the DPA shipment.
- ☐ Q24.0 Knoop Hardness Testing per MIL-G-45204.
- ☐ Q25.0 Reserved.

## COMPLIANCE

- ☐ Q27.0 ISO 9001, Quality management systems – Requirements.
- ☐ Q28.0 AS91002, Quality management systems – Requirements for aviation space, and defense organizations.
- ☐ Q29.0 AS9100 Quality Management System Requirements.
- ☐ Q32.0 Compliance with ANSI/NCSL2540-1-1994 “Calibration System Requirements” is required.
- ☐ Q33.0 Compliance with MI-STD-1520 “Corrective Action and Disposition System for Nonconforming Material” is required.
- ☐ Q34.0 Compliance with MIL-STD-1535, “Supplier Quality Assurance Program Requirements” is required.
- ☐ Q35.0 All manufacturing and testing must be performed in A Defense Electronic Supply Center certified facility within the continental U.S.A.
- ☐ Q36.0 Lead Material and Finish must be identified as part of documentation shipped.

## PRINTED WIRING BOARDS

- ☐ Q37.01 Printed Wiring Boards must be produced in accordance with MIL-PRF-31032 at a DESC approved facility.
- ☐ Q37.02 Printed Wiring Boards processed in the same lot (s) as the pieces delivered will be included with each shipment for Test Evaluation at FEI.
- ☐ Q38.0 Radiographic Inspection per FEI A42012-PRO is required.

## MATERIAL REVIEW

- ☐ Q39.0 Decisions to accept discrepancies (variations from FEI drawing and specifications) detected at seller's facilities, must be made by FEI unless otherwise specified by the procurement document. Shipment of discrepant items must be accompanied by written approval by FEI.
- ☐ Q40.0 PROHIBITED MATERIALS

  The following materials are prohibited for use unless specifically approved in writing by FEI.

  a. Cadmium, zinc, or selenium, except internal to heretically sealed devices. Use of Cadmium as an external finish on aircraft and ground based equipments is allowed.
  b. Pure, unalloyed tin, Bright tin or bright copper shall not be deposited on any surface requiring soldering. Alloyed tin must have at least 3% lead content.
  c. Corrosive solder fluxes unless detailed cleaning procedures are specified along with appropriate verification methods to ensure removal of residual contaminants.
  d. Mercury and compounds of mercury.
  e. Corrosive (acetic acid-evolving) silicones.
  f. All honeycomb except MIL-C-7438 perforated material.
  g. Zinc chromate as a finish coat.
  h. Methyl Ethyl Ketone (MEK)

Q41.0 ELECTROSTATIC DISCHARGE CONTROL ANSI/ESDS 20.20.

The seller shall provide and maintain a program for electrostatic discharge control. This program is subjected to review and approval by FEI.

## FAILURE NOTIFICATION

☐ Q42.0 If any failure occurs, testing will be interrupted and FEI notified is writing within twenty-four hours. Testing not proceed until authorized by FEI.

☐ Q43.0 Suppliers are to notify FEI when they suspect a counterfeit part was shipped to FEI

## SOLDERABILITY, PARTS, PCB's, AND ASSEMBLIES

☐ Q50.0 Solderability testing per MIL-STD-883 method 2003 is required. Test data to be provided with shipment.

## ELECTRONIC ASSEMBLIES

☐ Q51.0 All Assemblies shall meet the requirements of IPC-A-610.

## SHELF LIFE MATERIAL AND PERISHABLE GOODS

☐ Q60.0 All material will be clearly labeled with the expiration date, lot number and storage requirements.

☐ Q61.0 All age sensitive material must upon receipt have 80% of the manufacturers stated shelf life remaining.

☐ Q62.0 All Magnet Wire shall be supplied with Certification stating the date of manufacture

☐ Q63.0 All syringes purchased individually or used to package the purchased materials shall not use silicon lubricants

## COUNTERFEIT PART/MATERIAL REQUIREMENTS

☐ Q70.0 All procurements require exclusive use of OCM/OEMS and their authorized distribution chains.

☐Q71.0 Verification of Authenticity for purchases of parts and materials through non-authorized sources must be evaluated per section 4 of FEI document 49959-PRO.

## MAJOR CHANGES

☐ Q80.0 The Seller shall inform FEI of any Major Changes prior to incorporation. Major Changes are defined as changes in location, key personnel, and approved processes.