

QUALITY NOTES

Code Title
Description

QA01 Certificate of Conformance

By accepting Purchase Orders from SemiGen with this Quality Assurance Material Code imposed on it, the Seller is certifying (all Manufacturers and Suppliers including Distributors) that all product being provided to SemiGen to satisfy this Purchase Order contains only new and authentic product.

All Distributors shall provide with the product the necessary acquisition traceability documentation (i.e. C of C or packing slip) provided by the Original Equipment or Component Manufacturer and all previous Distributors within the supply chain for all product provided in the shipment. Failure to provide such documentation shall be justification for not accepting the product.

The supplier shall also provide a Certificate of Conformance (C of C) with the delivery of product stating that the requirements of the purchase order/subcontract have been fully met and any required chemical/physical analysis has been performed. Substantiating evidence/data shall be on file and available upon request. A Certificate of Analysis is acceptable in lieu of a Certificate of Conformance.

The C of C shall be endorsed by an authorized representative of the company. The C of C / Packaging documentation must contain the SemiGen part number listed on the Purchase Order and the supplied part number if different; providing it is per the SemiGen drawing / specification called out on the purchase order.

The supplier shall maintain this documentation for a minimum of 7 years.

QA02 Chemical Test Report

Results of chemical tests conducted on materials submitted must be provided. The report shall identify material specification (including revision level) tests conducted, and identify the material. Analysis reports must be sent with each lot shipped and must be endorsed by a responsible representative. Each report shall positively identifiable to the lot shipped and must show composition and purity of chemicals in percent, or other industry standard units.

QA03 Certificate of Special Process

Suppliers must provide a Certificate of Conformance certifying compliance with all special processes required in executing this procurement. Supplier should provide, or have on file, objective evidence that all Special Process Requirements were met and all required tests were performed. Some examples of special processes are chemical (including plating), heat treating, protective coating, welding, brazing, non-destructive testing, etc.

QA04 Certificate of Special Process NADCAP Certification Required

Suppliers must provide a Certificate of Conformance certifying compliance with all special processes required in executing this procurement. All special process suppliers utilized on this purchase order/subcontract require certification by NADCAP. Supplier should provide, or have on file, objective evidence that all Special Process Requirements were met and all required tests were performed. Some examples of special processes are chemical (including plating), heat treating, protective coating, welding, brazing, non-destructive testing, etc.

QUALITY NOTES

QA05 Chemical/Physical Report

The supplier shall provide results of chemical/physical testing conducted on materials furnished on this purchase order/subcontract. These results shall be in accordance with the purchase order requirements and signed by an authorized representative of the company and sent to SEMIGEN

QA06 Source Inspection

The products or services specified on this purchase order/subcontract require Customer Source Inspection prior to shipment from the supplier's facility. Supplier shall notify the buyer at least five (5) days in advance of inspection and/or acceptance testing. Final acceptance of deliverable items shall be at SEMIGEN. In order to facilitate the performance of source inspection, the seller shall furnish the necessary facilities and equipment, supply data, and perform tests as required by applicable drawings, specifications, and inspection instructions.

QA07 Pre-Cap Inspection

The products or services specified on this purchase order/subcontract require Customer Source Inspection. This inspection shall occur at points agreed to by SEMIGEN (i.e. before closure, sealing, foaming, and tuning pot encapsulation). Supplier shall notify the Buyer at least five (7) days in advance of inspection and/or acceptance testing. Final acceptance of deliverable items shall be at SEMIGEN.

QA08 Process Controls

The supplier is expected to institute sufficient process controls to result in consistently meeting the quality requirements for the specific product being ordered. SEMIGEN shall have the right to perform process control audits.

QA09 Part Traceability

The shipment record provided with each delivery of parts shall identify the Original Equipment Manufacturer (OEM) CAGE code/ manufacturer identification, device part number and lot number/date code. In addition each container shall be marked with the OEM CAGE code/manufacturer identification, device part number and lot number/date.

QA10 Recorded Supplier Data

The supplier is to provide data with each shipment in accordance with the following requirements. The supplier is required to notify and receive written authorization from SEMIGEN, if deviations from the following criteria are desired, i.e. sampling, etc

- The supplier will perform and record the results of mechanical and/or electrical test in accordance with the electrical/dimensional parameters specified in the applicable specification/drawing, unless otherwise specified in the purchase order.
- Variable data shall be utilized for 100% of the end item acceptance parameters within a specification or drawing. Attribute data shall only be utilized to identify the condition (i.e. form feed, illumination, etc.)
- Recorded data shall be traceable to the specific parts that were inspected / tested. Traceability may be controlled through part serialization, tagging, or identification of individual unit packaging unless otherwise specified in the purchase order or specification/drawing.
- 100% of the lot shall be tested for electrical parameters unless otherwise stated in the purchase order or specification/drawing.
- For mechanical parameters, the lot shall be inspected to a 4.0% AQL, level S-4, but with

QUALITY NOTES

no failures allowed, in accordance with ANSI/ASQ Z1.4 or MIL-STD-105, with specific lot size, AQL, and sample size identified on each data sheet.

- For mechanical parameters, the data shall include drawing locations, dimensions and tolerance.

QA11 Shelf Life Material – Require 80% useful life remaining

If material is adversely affected by time, the container and/or certification shall be marked with the expiration date and the recommended storage conditions. Information supplied shall be in accordance with any military/SEMIGEN specification referenced on the drawing or on the purchase order. **Do not deliver material with less than 80% of the useful shelf life remaining.**

QA12 Lot Code Uniformity

All parts ordered shall be one lot code, one date code, and from one continuous Manufacturing / Wafer Lot.

QA13 AS9102 First Article Inspection

This clause requires the supplier to perform a First Article Inspection (FAI) in accordance with AS9102 on the product described by the Purchase Order. The FAI is a complete and documented physical and functional inspection process to verify that prescribed production methods have produced a fully confirming item as specified. The supplier is required to submit the First Article Inspection report with the segregated First Article unit. Seller shall not submit items from a production run for Buyer inspection prior to Buyer's acceptance of the FAI report. If the Supplier elects to ship product, prior to Buyer's acceptance of the FAI report, it is at their risk.

The supplier shall perform a first article inspection for this part number if any of the following conditions occur:

- (1) First time product is manufactured for production.
- (2) A change in the design affecting fit, form, function and/or interchangeability of the part.
- (3) A significant change in manufacturing processes.
- (4) A lapse in production for two years
- (5) A change in manufacturing location.

Any change in configuration will require a delta FAI. The supplier shall notify the Buyer in advance of any changes in manufacturing locations or processes so that the Buyer's QA organization can determine whether a delta FAI is required.

When documenting the FAI, Seller may use the forms contained within AS9102 or their equivalent, so long as the forms contain all of the information required by AS9102.

If the item is being built to a SemiGen drawing and parts list, the supplier shall provide the C of Cs

from their suppliers for all of the material and if the material is purchased from a distributor, the OEM C of C must also be provided.

The FAI report shall also include certifications for all raw materials and for all special processes performed. All required electrical test acceptance data shall be provided with the FAI report.

The FAI report shall also consist of a ballooned drawing with a completed Form 3 indicating all drawing dimensions, characteristics and notes have been inspected with the actual measured value for all dimensions on the drawing.

QUALITY NOTES

QA14 Packaging of Electrostatic Devices

Devices that are ESD sensitive shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

QA15 Serialization

Serial numbering required. See drawing for details.

QA16 Identification of Lot/Date Code

Supplier shall record all delivered lot identification(s) and/or date code(s) on the outside of intermediate and/or unit packages. Multiple lot/date codes shall be individually packaged and labeled. For tape and reel packaged parts, only one date code per reel is allowed.

QA17 Unique Identification (UID)

The item(s) supplied under this Purchase Order shall contain a Department of Defense (DoD) approved Unique Item Identification (UID), as specified in DFARS 252.211-7003, Item Identification and Valuation. Reference MIL-STD-130L, DoD Standard Practice, Identification Marking of U.S. Military Property.

QA18 Government Source Inspection (GSI)

The products or services specified on this purchase order/subcontract require Government Source Inspections (GSI) prior to shipment from the supplier's facility. Upon receipt of this order promptly notify government representative who normally services the supplier's facility so appropriate planning for government inspection can be accomplished. All shipments on this PO/Subcontract must be accompanied by objective evidence of government acceptance. The products or services specified may require Government Quality Assurance Surveillance. Therefore, prior to commencement of any special test, notify the government representative. The government representative is requested to verify by signature all reports of testing accomplished, verifying only those portions actually witnessed. Such verification shall signify concurrence with the recorded data, but not necessarily with conclusions derived there from.

QA19 Independent Distributor Certificate of Conformance.

Traceability Documentation- With each shipment the supplier must provide a Certificate of Conformance that includes the following information:

- SEMIGEN Purchase Order and Line Item Number
- Quantity included in shipment
- Part Number as listed on the Purchase Order
- Manufacturer's Name and Address and Cage code
- Manufacturer's Part number (If Different)
- Lot code/Date code
- Product Description
- An authorized representative of the supplier shall sign and date the certificate attesting to the conformance

The supplier shall provide acquisition traceability provided by the original component manufacturer and previous distributors for each shipment.

Military compliant microcircuits and discrete semiconductors shall adhere to the acquisition traceability requirements in MIL-PRF-38535 and MIL-PRF-19500. These documents require that manufacturer certifications follow the parts throughout the supply chain. (In no case shall the acquisition traceability documentation be altered or shows signs of alteration. This is grounds for immediate rejection of the lot/shipment.) The original component manufacturer's certification shall

QUALITY NOTES

include (at a minimum):

- Manufacturer's name and address.
- Device type
- Lot identification code (including plant code).
- Conformance inspection acceptance date.
- Quantity of devices in shipment from manufacturer.
- Statement certifying product conformance and traceability.
- Signature and date of transaction
- Customer or Distributors name and address

Other device deliveries should include the documentation cited above for military parts as available and applicable. At a minimum these device deliveries shall be accompanied by documentation (for example, packing slips, invoices) that confirms acquisition traceability back to the device OEM.

Acquisition traceability also includes distributor documentation for each distributor in the supply chain:

- Distributor's name and address.
- Name and address of customer as involved in the chain of custody.
- Quantity of devices in shipment.
- Lot/Date code

Copies of acquisition traceability documentation must be maintained by the supplier for a minimum of 15 years.

QA20 Workmanship

The product purchased must meet the soldering and workmanship requirements contained in the latest issue of IPC/ANSI J-STD-001, Class 3 unless otherwise specified on the purchase order/subcontract or drawing.

QA21 Printed Circuit Boards

The articles specified on the face of this purchase order are printed wiring boards that are to be manufactured to IDS, Military, or IPC specification(s). The following requirements are in addition to those specified:

Military specification(s): for double-sided and multilayer printed wiring boards, a minimum of two (2) quality conformance micro sectioned test coupons for each production panel utilized on this order must be maintained by the manufacturer. They must be available for review for a minimum of 3 years after delivery, for each lot of printed wiring boards shipped against this purchase order.

IPC specification(s): for double-sided and multilayer printed wiring boards, micro sectioned coupon acceptance testing and frequency shall be performed as specified for Equipment Class 3. Test coupons for each production panel utilized on this order must be maintained by the manufacturer and available for review for a minimum of 3 years after delivery, for each lot of printed wiring boards shipped against this purchase order.

All printed wiring boards, unless otherwise specified, shall be packaged in accordance with contract requirements and unit packaged to prevent contamination from humidity.

QA22 Raw Material Report and/or Certificate of Conformance

The supplier shall provide a Report or Certificate of Conformance (C of C) for the raw material supplied or used in the parts supplied. The C of C shall be from the original raw material supplier

QUALITY NOTES

and include original supplier, lot number, material specification, tests conducted and any other relevant information needed to identify the raw material. Acceptable examples include foundry report, mill report, etc.

QA23 SemiGen Supplied Materials

The supplier shall comply with the following requirements with respect to the SemiGen supplied materials:

- (1) Material furnished by SemiGen will be handled and stored separately from the supplier's material.
- (2) Visually inspect such material for accountability and damage from shipment and report to the buyer any non-conformance.
- (3) Certify each delivery as follows: "Material used on this order is the material furnished by the buyer, and no unauthorized substitutions have been made."

QA24 Calibration Requirements

Calibrate in accordance with MIL-STD-45662, ANSI Z540-1, or ISO 10012-1. Test Data and Calibration Certification of Conformance required. Calibration accuracy/method per manufacturers specs. or guidelines provided. All standards used are to be traceable to N.I.S.T. and on file. Report any 'out of tolerance' conditions found immediately.

QA25 Pre-Approval of Documentation

Supplier shall submit documentation – for SemiGen comment and approval – that describes the following, as noted on the purchase order:

- (a) Product design drawings for the part number(s) described on the face of the PO.
- (b) Written description(s) of each special process(es), such as soldering for each part number(s) on the face of the PO.
- (c) Manufacturing Procedures for the part number(s) described on the face of the PO.
- (d) Special Tooling/Equipment drawings for the part number(s) described on the face of the PO.

QA26 Pre-Approval of Personnel Qualifications

Supplier shall submit, prior to start of manufacture, the current qualification documentation of all specially trained personnel for any special processes, such as soldering, welding, painting, plating, etc., that are used to produce the part number[s] described on the face of the P.O.

QA27 Temperature Recorder

A temperature recorder is required with the shipment.

QA28 Element Evaluation Testing for Class H Active Elements

The supplier or the manufacturer shall perform one hundred percent electrical testing to the electrical test parameters, limits, and conditions specified in the SEMIGEN Specification Control Drawing (SCD). If there is no SCD, the manufacturer's published data book shall be used to establish the electrical parameters, limits, and conditions.

The supplier or manufacturer shall perform one hundred percent visual inspection to assure conformance with the applicable die related requirements of MIL-STD-883, method 2010; MILSTD-750, methods 2072 and 2073; and the applicable acquisition documents.

Sample testing in accordance 1611432, Table I, Subgroups 3, 4, and 5 is required unless the die to be supplied is from a wafer lot previously shipped to SEMIGEN and that already has acceptable test data indicating compliance to the above document. Electrical test parameters, limits, and conditions shall be as stated in the SEMIGEN SCD. If there is no SCD, the

QUALITY NOTES

manufacturer's published data book shall be used to establish the electrical parameters, limits, and conditions.

Test data indicating successful completion of Subgroup 3, 4, and 5 testing must accompany this shipment.

QA29 Lot Evaluation Testing in accordance with the SemiGen Drawing

Lot evaluation testing in accordance with the SCD is required, unless the die to be supplied is from a wafer lot that has already been approved by SEMIGEN.

QA30 Visual Inspection Requirements for Class H Active Elements

Die must meet the visual inspection criteria of Method 2010 of MIL-STD-883. All transistors and diodes must meet the applicable visual inspection criteria of Methods 2072 and 2073 of MIL-STD-750.

QA31 Visual Inspection Requirements for Class H Passive Elements

All elements must meet the visual inspection criteria of Method 2032 of MIL-STD-883.

QA32 Element Evaluation Testing for Class H Thick and Thin Film Printed Circuit Boards

Parts shall be tested in accordance with the following substrate evaluation requirements of MILPRF-38534, Table C-V.

Subgroup 1 electrical testing is only required if there are resistors or capacitors on the drawing. (Test data is not required.)

Subgroup 2 visual inspection on 100% of the printed circuit boards in accordance with MIL-STD-883, method 2032 and the applicable acquisition document is required. (Test data is not required.)

Subgroup 3 testing is required as follows:

- (a) Physical Dimensions are to be made on a 5-piece sample. All dimensions specified on the drawing must be measured and the actual measurement recorded and supplied to SEMIGEN.
- (b) Visual inspection on a 5-piece sample is not required since 100% visual is already specified.
- (c) Electrical test on a 5-piece sample is not required since 100% electrical is already specified.

Subgroup 4 testing is required as follows:

- (a) Conductor thickness or resistivity measurements are required on a three-piece sample. (Pass/fail information only is required.)
- (b) Film adhesion testing is required. (Pass/fail information only is required.)
- (c) Solderability testing is not required.

Subgroup 5 testing is required as follows:

- (a) Temperature coefficient of resistance testing is required on a three-piece sample only if there is resistors. (Actual test measurements must be supplied to SEMIGEN)
- (b) Wire bond evaluation is to be performed by SEMIGEN, if required. (Parts must be capable of meeting the requirement.)
- (c) Die shear evaluation is to be performed by SEMIGEN Systems, if required. (Parts must be capable of meeting the requirement.)

QUALITY NOTES

Test data indicating successful completion of Subgroup 3, 4, and 5 testing must accompany this shipment.

QA33 Element Evaluation Testing for Class H Housings, Cases and Covers

Parts shall be tested in accordance with the following package evaluation requirements of MILPRF-38534, Table C-VI.

Subgroup 1, 2, 3, and 4 testing shall be performed on each lot. Lot definition per MIL-PRF-38534 shall apply. Physical Dimensions shall be performed on all dimensions specified on the SEMIGEN

drawing on all samples required. Actual measurements shall be recorded and supplied to SEMIGEN. Solderability testing is required only if there are external leads/pins.

Subgroup 5 and 6 testing shall be performed one time for Class H devices and at 6-month intervals for Class K devices unless a change in material or plating is made.

Test data indicating successful completion of all testing must accompany this shipment.

QA34 Wire Bond Strength Testing for Passive Elements

The supplier is required to perform wire bond evaluation as follows in order to comply with the requirements of MIL-PRF-38534, Table C-III.

- a) The test sample is to include at least five elements and ten wire bonds minimum (an equal number on each element).
- b) One mil gold wire shall be used unless specified otherwise by the procuring activity.
- c) The sample shall be subjected to the bond strength testing in accordance with the latest revision of MIL-STD-883, Method 2011.
- d) The minimum gram force to meet for 1 mil gold wire is 3.0 grams.
- e) The supplier shall provide a datasheet indicating the wire size and composition, the pull force obtained for each sample and the category of separation/failure.
- f) The element metallization will be acceptable if no failure occurs. If only one wire bond fails, a second 10 wire bond sample will be selected and tested. If the second sample contains no failures, the bonding test results and the element lot are acceptable. If the second sample contains one or more failures, or if more than one failure occurs in the first sample, the element lot shall be rejected.