SYPRIS ELECTRONICS
PURCHASE ORDER ATTACHMENT "Q"

Attention Suppliers!

Q-Codes have changed!!!

The coded Requirements listed within this Attachment are applicable to material furnished under the Purchase Order upon which they are referenced. If a code referenced on the Purchase Order cannot be located within this document, notify the appropriate Sypris Electronics Purchasing agent for clarification prior to shipment of product. Failure to comply with these requirements, when referenced on the Purchase Order, will be cause for rejection of material at Sypris Electronics Receiving Inspection.
In the event of conflict between the requirements listed herein and Purchase Order text, the Purchase Order text shall prevail.

A01 **INSPECTION SYSTEM** - The Subcontractor/ Supplier shall maintain an inspection system which will assure that all supplies and services delivered to Sypris Electronics conform to the applicable requirements, whether manufactured or processed by the Supplier, or procured from a lower tier supplier. The Supplier shall perform or have performed the inspections and tests required to substantiate product conformance to drawing, specifications and contract requirements and shall also perform or have performed all inspections and tests otherwise required by the P.O. The Supplier's inspection system shall be documented and shall be available for review. Supplier will notify Sypris Electronics of changes in product and/or process, changes of suppliers, changes of manufacturing facility location and, where required, obtain Sypris Electronics approval prior to making any changes in product and/or process definitions, which affect form, fit or function. This includes any deviations to specified approved material suppliers and/or substitutions to component part numbers. Supplier will notify Sypris Electronics within 24 hours of the discovery of nonconforming product and shall obtain prior approval before shipping nonconforming product.

The supplier's Certification of Conformance represents that the shipment does not contain any 'suspect' or 'known' Counterfeit Part, Material, or Work and ensures that parts, material or work are procured only through Original Equipment Manufacturers (OEMs)/Original Component Manufacturers (OCMs) or their Franchised Distributors or Authorized Supplier. Any use of other than an Authorized Supplier requires Sypris Electronics written approval prior to procurement and use, which shall be contained within the deliverable data package.
The supplier shall verify the procurement source and associated certifying documentation. Supplier's receiving inspection process shall utilize incoming inspection or test methods, or both, to detect potential counterfeit parts, material or work.
The supplier shall flow this clause in its entirety or equivalent (replacing "Sypris Electronics" with "supplier") down to all lower tier subcontracts to prevent the inadvertent use of Counterfeit Parts, Material or Work. When an Authorized Supplier is not utilized by the supplier's lower tier, the supplier shall provide a copy of the risk assessment and their written approval within the deliverable data package.

A02 **J-STD-001 Class 3** – This assembly shall be manufactured in accordance with IPC/EIA J-STD-001 Class 3 and shall meet the inspection criteria as specified in IPC-A-610 Class 3.

A03 **QUALITY SYSTEM** - The subcontractor/ supplier shall maintain a quality system in accordance with ISO 9001:2008, AS9100 or Sypris Electronics approved equivalent. Supplier will notify Sypris Electronics and obtain prior approval before making any changes in product and/or process definitions, which affect form, fit or function. This includes any deviations to specified approved material suppliers and/or substitutions to component part numbers. Supplier will notify Sypris Electronics and obtain prior approval before shipping nonconforming product.

The Contractor's Laboratory shall conform to the requirements of the elements described in ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories. Third party registration by an accredited registrar will be accepted. A Contractor declaring compliance to ISO/IEC 17025 with no formal accredited registrar will be reviewed by Sypris Electronics. The Contractor's system will be subject to review and approval at all times by Sypris Electronics. The Contractor shall maintain test control systems that confirm Sypris Electronics hardware meets test requirements listed on the order Sypris Electronics may inspect all deliverable items before, during or after test, before shipment or during final inspection and acceptance at destination. Sypris Electronics may require repair or rework of any deliverable item that fails to meet requirements. Rejected items may be submitted during or after testing but must be confirmed acceptable, by the Buyer, before shipment may occur.

A21 **OFFSHORE APPROVAL** - No subcontracts or purchase orders which involve design, manufacture, production, assembly or test in a location not in the United States, of equipment, assemblies, accessories or parts which are not covered by a Specification or a Standard listed in MIL-P-11268 (may have been cancelled), MIL-E-16400 (may have been cancelled) or MIL-E-5400 (not sure of status) shall be made under this contract without specific approval of the contracting officer. Parts, excluding Large Scale Integrated Circuits (LSIC) or any likeness thereof, may be procured from distributors located in the United States even if this distributor is supplied from a manufacturer not located in the United States as long as the distributor complies with the requirements of Quality Code G24 herein.

A22 **NOTIFICATION OF SUPPLIER CHANGES**

The Organization shall provide in writing advance notification to their Sypris Electronics Contract Administrator of any change(s) to, Name, Quality Management Systems, Ownership, facilities, or processes at the Organization or the Organizations sub-tier that could affect the Customers contracted product.

C03 **RIGHT OF ENTRY -** Sypris Electronics, its customers and regulatory agencies reserve the right of entry, within a mutually agreed time, to any place necessary to determine and verify the quality of contracted work, records and material.

C06 **Certificate of Conformance -** The supplier shall provide a signed hard copy Certificate of Conformance (C of C) with each shipment stating that the articles provided per this order have been manufactured, tested, and inspected in accordance with all requirements set forth by this purchase order.

The OEM C of C must be made available at the request of Sypris but may be held by supplier.

The applicable material test results, process certifications and inspection records shall be presented upon Customer's request. Organization shall perform inspection, as necessary, to determine the acceptability of all articles under this order. All articles submitted by organization under this order are subject to final inspection and acceptance at customer'

The certification must contain the following:

- Sypris Purchase Order Number
- Sypris Part Number specified on the Sypris P.O.
- Name and address of manufacturing location (or cage code)
- Manufacturer Part Number
- Manufacturer's traceability. Examples of traceability include, but are not limited to the following: lot code, date code, heat number, etc. (Note: It is not acceptable to provide a CofC for any part with missing traceability information on the CofC unless there is absolutely no traceability information that was ever created during the manufacture of a part. This should never be the case for an electrical component.)
- Quantity Shipped
- Revision (Required if the part is manufactured to a revision-controlled drawing.)
- Serial numbers (Required if the parts are serialized.)
- Expiration date (Required only if the item has an expiration date.)
- Signature and date by company representative (electronic signature is acceptable)

C06_LF RoHS Compliance

A declaration must accompany the shipment which states compliance with Directive 2011/65/EU (RoHS 2) which restricts the use of certain hazardous substances in the design and manufacture of Electrical and Electronic Equipment.

This product shall not contain any of the banned substances.

The substances currently regulated by the RoHS 2 Directive are listed below:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr(VI))
- Polybrominated biphenyl (PBB) flame retardants
- Polybrominated diphenyl ether (PBDE) flame retardants (including Deca-BDE)

The maximum allowable concentration is 0.1% by weight in homogeneous material for Lead(Pb), Mercury(Hg), Hexavalent chromium(Cd), Polybrominated biphenyl(PBB), Polybrominated diphenyl(PBDE) flame retardants (including Deca-BDE) and 0.01% for Cadmium.

In addition to the requirements of C06, a RoHS declaration or certificate of conformance must accompany each delivery. It can be added to the C of C requirements of C06 or it can be a standalone document which specifically includes:

If the RoHS declaration is a separate standalone document, it must contain the following:

- **RoHS declaration statement**
- Sypris Purchase Order Number
- Sypris Part Number specified on the Sypris P.O.
- Name and address of manufacturing location (or cage code)

- Manufacturer Part Number
- Manufacturer's traceability. Examples of traceability include, but are not limited to the following: lot code, date code, heat number, etc. (Note: It is not acceptable to provide a CofC for any part with missing traceability information on the CofC unless there is absolutely no traceability information that was ever created during the manufacture of a part. This should never be the case for an electrical component.)
- Quantity Shipped
- Revision (Required if the part is manufactured to a revision-controlled drawing.)
- Serial numbers (Required if the parts are serialized.)
- Expiration date (Required only if the item has an expiration date.)
- Signature and date by company representative (electronic signature is acceptable)

CFM **Customer Furnished Material (CFM)** – material provided by the customer is to be supplied in production ready condition. Production ready is defined as follows:

- Material properly identified, packaged, and shipped in a manner to prevent electrical, mechanical, and/or ESD damage.
- Leads prepped/formed in accordance with specification as applicable.
- Lead finish in accordance with applicable J-STD requirements.
- SMT material properly taped and reeled and/or placed in trays in accordance with JEDEC standards.
- Moisture sensitive material identified and packaged in accordance with J-STD-033.
- Material shall be capable of meeting all specified contract solderability requirements.

E50 **SOLDERABILITY** - Parts shall be capable of meeting the solderability requirements of Category 3 durability as defined in ANSI/J-STD-002 or equivalent. Surface mount devices shall be pre-tinned using SnPb 63/37 or 60/40 with no copper, gold, or base metal visible on the solderable surface.
BGA's that are RoHS compliant or otherwise have lead free solder balls MUST NOT be substituted for the part # ordered. All BGA's MUST contain tin/lead (Sn:63/Pb:37) solder balls as originally provided by the OEM or be re-balled by a Sypris qualified subcontractor.

G10 **MARKING** – Packing slips and lowest level of packaging shall be marked as a minimum with the following:

- Manufacturer
- Manufacturer Part Number
- Customer Part Number
- Lot/Date Code
- Quantity

G24 **MARKING -** Subcontracts, purchase orders, drawings, travelers and other related type documents provided to offshore vendors will not carry any 0NXXXXXX/98230 identification, nor will they reveal the Government prime contract number. No reference to DOD or MPO shall be made on the offshore procurement. Offshore manufactured parts are not to be identified with the "0N" part number designation until after they are received in the United States. If Government Source Inspection has been imposed on this order, Government verification will be required. If parts marked with the MPO identification code (0NXXXXXX/98230), including rejects, are allocated for non-MPO programs or for resale to other customers, then the markings associated with the MPO identification code must be removed from the parts before the parts are sent to non-MPO programs or other customers.

J06 **DATA, TEST DATA** - Suppliers are required to include a copy of the Quality Conformance Inspection Data (attributes data is acceptable) with each shipment covering the parts shipped. Any calculations, assumptions or failure analysis used to substantiate test results must be detailed.

J07 **FIRST PIECE INSPECTION DATA** – A supplier furnishing material manufactured to an assembly drawing will include a First Piece Inspection Data Report with the first shipment to Sypris Electronics or after a 2 year lapse of production, or in the case of a revision change. At a minimum, the First Piece Inspection will be a 100% dimensional inspection.

J08 **AS 9102 - FIRST ARTICLE INSPECTION REPORT /Delta First Article Inspection Report** – A supplier furnishing material manufactured in accordance with this P.O. for the first time, or after a 2 year lapse of production, or in the case of a revision change (only data on the delta) shall provide a First Article Inspection Report with the first shipment of material shipped to Sypris Electronics. The First Article Inspection Data shall be in accordance with the requirements of SAE AS 9102. Data on forms other than those listed in AS9102 **shall not be used** and will not be accepted.

The acceptable AS9102 forms can be obtained at http://www.sae.org/aaqg/publications
Attribute data (go/no-go) may be used if no inspection technique resulting in variable data is feasible. Attribute data is permitted when the design characteristic does not specify numerical limits (e.g. break all sharp edges). It is also permitted where qualified tooling is consistently used as a check feature and a go/no-go feature has been established for the specific characteristic. "ACCEPT" or "REJECT" shall be entered as a result of this inspection, as applicable.
Copies of all test records, certifications (Certifications of Conformance/Compliance must be specifically annotated with the product, raw materials, shelf-life materials, processes, special processes, finishes, marking inks, etc… call outs exactly as they appear on the drawing and must include lot code/batch/heat numbers, expiration dates. Etc), and other substantiating quality data is attached to the forms for applicable detail/subassembly or assembly and is considered an integral part of the submitted FAI report.

J09 **DIMENSIONAL INSPECTION 100%**
Seller shall perform 100% detailed/dimensional inspection, record the actual dimensional data for all drawing characteristics, and compliance with drawing notes for all parts. The recorded data, related material, and process certs (as applicable) shall be delivered with the parts for each lot shipped.

J10 **NADCAP Certified Special Process Requirement**. Special processes may include but are not limited to… anodizing, heat treating, plating, chemical conversion, welding and non-destructive test such as magnetic particle and penetrant inspection. Buyer shall have special processes identified by Supplier at time of quote. These MUST be approved by Sypris Quality Dept. in writing if Supplier or sub-tier supplier is not NADCAP accredited prior to placement of Purchase Order.

J11 **Deliverable Data** - Each deliverable device shall be supplied with the following:

A) Data specified in the referenced drawing.
B) Lot specific data necessary to prove compliance to all electrical performance and Group A testing requirements of the governing specification.

J12 Prohibited Materials Testing

This Purchase Order requires that all parts delivered contain no free Mercury (metallic form) or mercury compounds (i.e. mercuric oxide and mercuric chloride).

The supplier is responsible for performing all tests and certifying to Mercury Free requirements. Any exception must be approved in advance by Sypris Electronics in writing.

The supplier is exempt from verification of Mercury when:

- This requirement is not applicable to RoHS compliant material, Directive 2011/65/EU.

If the supplier has no capability to perform the Prohibitive Material Testing, or provide certification for the absence of Mercury, Sypris is to be notified at time of quote and in advance of accepting the P.O.

Sypris Quality shall make the determination to accept this exception of seek alternative sources.

For these exceptions, Sypris may approve the delivery of the material to Sypris and arrange to have material tested internally at Sypris incoming inspection or by a third party contractor.

K01 **AXIAL LEADED COMPONENTS** – Parts shall be taped in accordance with EIA Standard EIA-296-E with the following exceptions:

- For parts 0.200 inch long or less, the "B" dimension shall be 2.062 ±0.062.
- The "A" dimension shall be 0.200 (+0.200, -0.020) with maximum lead length sufficient to extend through width of tape.
- Lead trim is preferred to be flush with outside edge of tape. However, maximum extension may be 0.50 inch if trim is even.
- For RCR05 resistors, the "B" dimension shall be 2.00 to 2.10 inches.

K02 **RADIAL LEADED COMPONENTS** - Parts shall be taped in accordance with EIA Standard EIA-468-B with the following exception: Dimension "H" shall be 17mm minimum.

K03 **ALL COMPONENTS**

- Parts shall be packaged to prevent bending or damage to leads, seals, bodies at lowest level packaging.
- All ESD sensitive components shall be handled, packaged, marked and shipped to Sypris Electronics' in accordance with the requirements specified in ANSI/ESD-S20.20.
- All moisture sensitive components that are classified as being sensitive to moisture absorption shall be supplied in accordance with IPC/JEDEC J-STD-033A.
- **Suppliers shall provide all parts with a lot/date code no more than two (2) years prior to the date of the Sypris Purchase Order**
- The supplier may provide results of solderability tests performed of older date code material, in advance, to Sypris for review as part of the approval process
- Material received with date codes older than two (2) years without prior Sypris approval:
  - Will result in material rejected and sent to MRC
  - May result in material being returned via RMA
  - May result in delay of payment while solderability tests are performed
- Any deviations shall require advance Sypris Electronics approval
- In addition batteries, which could electrically short when coming in contact with one another shall be individually packaged or wrapped at the lowest level of packaging to prevent electrical shorts.

K05 **DUAL-IN-LINE PACKAGE** – Parts shall be supplied in sticks suitable for use with automatic handling equipment.

K20 **MOISTURE SENSITIVE COMPONENTS -** Moisture sensitive part packaging requirements See Q-Code K03, K30 or K32

K30 **SURFACE MOUNT & PIN GRID ARRAY DEVICES - TRAYS** - Surface mount and Pin Grid Array (PGA) devices shall be supplied in JEDEC style anti-static trays capable of withstanding 130°C. The JEDEC style trays shall be in accordance with JEDEC Publication JEP95.

LOOSE OR BULK DEVICES WILL NOT BE ACCEPTED.

- All ESD sensitive components shall be handled, packaged, marked and shipped to Sypris Electronics' in accordance with the requirements specified in ANSI/ESD-S20.20.
- All moisture sensitive components that are classified as being sensitive to moisture absorption shall be supplied in accordance with IPC/JEDEC J-STD-033A.
- Optional characters may be specified to define the JEDEC tray in the format of: **-cc-nnn-vv-xx**

For example, K30-CS-004-AA-TL requires the part to be packaged in a tray conforming to:

- JEDEC Carrier Standard 004
- Variation AA
- Component Pin 1 orientation is to Top Left corner of tray towards tray chamfer

Note: -xx component tray orientation shall be determined per Plan View of tray in JEDEC STD 95-1. Per Plan View, tray chamfer is located in Top Left corner of tray.

Two digit characters used shall be utilized to indicate orientation shall be T and L:

- TL for Top/Left
- TC for Top/Center
- TR for Top/Right;
- LT for Left/Top
- LC for Left/Center
- LB for Left/Bottom.

Other rigid trays may also be acceptable. If a non-JEDEC defined tray is acceptable, the tray manufacturer's designation shall be specified in place of the optional JEDEC tray identifier**.**

K32 **SURFACE MOUNT DEVICES – TAPE AND REEL** – Surface mount devices shall be supplied on anti-static embossed tape or punched tape in accordance with EIA Standard EIA-481 and EIA **Guideline EIA-783.**

LOOSE OR BULK DEVICES WILL NOT BE ACCEPTED.

All ESD sensitive components shall be handled, packaged, marked and shipped to Sypris Electronics' in accordance with the requirements specified in ANSI/ESD-S20.20.

- All moisture sensitive components that are classified as being sensitive to moisture absorption shall be supplied in accordance with IPC/JEDEC J-STD-033A.
- Optional characters (-ww-pp) may be specified to define the tape width and cavity pitch on the tape where:
- -ww is the tape width in millimeters. Allowed values are: 08, 12, 16, 24, 32, 44 or 56
- -pp is the cavity pitch in millimeters. Allowed values are: 02, 04, 08, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 or 56.

Note: Pitch may only be specified if the tape width is also specified.

- Any deviations shall require advance Sypris Electronics approval

L01 **SAFETY -** The material must be accompanied by a copy of "Safety Data Sheet" as specified in 29 C.F.R. 1910.1200, or an exemption to this standard signed by a representative of your company.

T01 **WIRE** – Wire and/or cable shall be supplied in one continuous length per spool. Splices are allowed providing the joint does not exceed the overall diameter of the wire or cable. Minimum lengths of 100 feet are required between splices. All spools will be identified as to lengths on them.

U10 **PRINTED CIRCUIT BOARDS / COUPONS REQUIRED -** Printed Circuit Boards shall meet the requirements of the applicable specification as noted on the drawing. Each shipment of PCB's shall include:

- C of C (as defined in **C06**)
- Results of micro-section analysis or Group A test data per applicable specification
- Electrical test data
- Inspection data
- A sample of cross-sections (a minimum of one from each lot representing the X and Y directions) as well as a sample of test coupons (a minimum of two from each lot) must accompany each shipment.
- In addition, the PWB manufacturer shall be responsible for retaining a sample of micro sections and coupons in addition to those shipped to Sypris

  NOTE: Quality conformance test coupons shall be made from the panels corresponding to the boards produced from them and shall be traceable to the boards produced from the panels. A sample of these coupons shall be selected randomly per the applicable requirement(s) and shall be cross-sectioned, accordingly. The cross-sections MUST represent the X and Y directions for annual ring purposes.

- A solder-ability sample for each date/lot code shall be included with each shipment and must be a full panel array, same configuration as production boards will be supplied
- First article dimensional data shall be included with the first shipment of each new PCB or Rev. change.
- **PCB humidity control packaging -** PCB's must be shipped in accordance with drawing specifications and at minimum:
  - Moisture Barrier Bag (MBB)
  - Desiccant - The quantity and quality of the desiccant material selected should be in accordance with IPC-J-STD-033
  - Humidity Indicator Card (HIC) - The type and usage of the HIC should be in accordance with IPC-J-STD-033
  - Packaging Methods - Internal (Dry Packaging) Recommended
- Any deviations shall require advance Sypris Electronics approval

U10IS **PWB – Immersion Silver PWB's -** Printed Circuit Boards shall meet the requirements of the applicable specification as noted on the drawing. Each shipment of PCB's shall include:

- C of C (as defined in **C06**)
- Results of micro-section analysis or Group A test data per applicable specification
- Electrical test data
- Inspection data
- Visually, circuits should be uniform and silver in color

- A sample of cross-sections (a minimum of one from each lot representing the X and Y directions) as well as a sample of test coupons (a minimum of two from each lot) must accompany each shipment.
- In addition, the PWB manufacturer shall be responsible for retaining a sample of micro sections and coupons in addition to those shipped to Sypris

  NOTE: Quality conformance test coupons shall be made from the panels corresponding to the boards produced from them and shall be traceable to the boards produced from the panels. A sample of these coupons shall be selected randomly per the applicable requirement(s) and shall be cross-sectioned, accordingly. The cross-sections MUST represent the X and Y directions for annual ring purposes.

- A solder-ability sample for each date/lot code shall be included with each shipment and must be a full panel array, same configuration as production boards will be supplied.
- First article dimensional data shall be included with the first shipment of each new PCB or Rev. change.
- **PCB humidity control packaging -** PCB's must be shipped in accordance with drawing specifications and at minimum:
  - **Packaging Methods** - Internal Dry Packaging
  - Moisture Barrier Bag (MBB)
  - Wrapped only in acid/sulfur-free, corrosion-inhibiting materials (Silver Saver is recommended)
  - Dry-packed with desiccant - The quantity and quality of the desiccant material selected should be in accordance with IPC-J-STD-033
  - Humidity Indicator Card (HIC) - The type and usage of the HIC should be in accordance with IPC-J-STD-033
  - Individually sealed
  - Any deviations shall require advance Sypris Electronics approval

U10-IST **PWB IST Testing Requirements -** The supplier shall perform IST testing in accordance with IPC-TM-650 method 2.6.26. A minimum of 6 test coupons shall be selected from each production lot.

Test #1 - 190°C IST Requirement

- The test coupons shall include all microvia configurations on the PCB.
- Prior to IST, expose coupons to 5 preconditioning cycles, 230°C peak temperature.
- Test a minimum of 6 coupons per lot for a total of 250 cycles, 190°C peak temperature.
- Acceptance criterion is <10% resistance change at 200 cycles.
- If any coupon fails, 100% of the IST coupons from the lot shall be tested.
- The Supplier shall provide the test report for each lot, including cross section data and analysis of any failures.

Test #2 - 150°C IST Requirement

- The test coupons shall include all via types on the PCB.
- Prior to IST, expose coupons to 5 preconditioning cycles, 230°C peak temperature.
- Test a minimum of 6 samples per lot for a total of 750 cycles, 150°C peak temperature.
- Acceptance criterion is <10% resistance change at 600 cycles.
- If any coupon fails, 100% of the IST coupons from the lot shall be tested.
- The Supplier shall provide the test report for each lot, including cross section data and analysis of any failures.

U10S **PWB - SPACE FLIGHT (in addition to U10)**

- PWB handling is categorized as sensitive flight / ground equipment, handle with extreme care.
- Sample PWB coupons are required with each PWB purchased by Sypris Electronics
- Each coupon shall be identified by the part number of the bare board it represents
- **Sypris Electronics will not accept Flight PWB's without first approving the Destructive Physical Analysis (DPA) report from NASA-GSFC**
- The Supplier is responsible for sending Coupons to NASA-GSFC for Destructive Physical Analysis (DPA). See Appendix A for instructions and form.
- The supplier shall notify Sypris when coupons are sent to GSFC
- Supplier must request GSFC DPA via electronic submittal must include the following email address: **sypris.quality@sypris.com**
- NASA's report recommendation must state: "The boards represented by these coupons are recommended for flight."
- The supplier must submit this report to Sypris, prior to shipping flight PWB's to Sypris
- A copy of the report must accompany each shipment of PWB's
- **PWB's which arrive at Sypris without this report will be rejected and place in MRC and may cause delay in payment to supplier**
- Failed DPA will result in a Supplier SCAR being issued to the PWB manufacturer

U10SG **PWB - SPACE FLIGHT GLM (Testing Performed at Pacific Testing Laboratories) (in addition to U10)**

- PWB handling is categorized as sensitive flight / ground equipment, handle with extreme care.
- Sample PWB coupons are required with each PWB purchased by Sypris Electronics
- Each coupon shall be identified by the part number of the bare board it represents
- **Sypris Electronics will not accept Flight PWB's without first approving the Destructive Physical Analysis (DPA) performed at Pacific Testing Laboratories and approved by NASA GSFC**
- The Supplier is responsible for sending Coupons to Pacific Testing Laboratories for Destructive Physical Analysis (DPA). See Appendix B for form.
- The supplier shall notify Sypris when coupons are sent to Pacific Testing Laboratories
- The report recommendation must state: "The boards represented by these coupons are recommended for flight."
- The supplier must submit this report to Sypris, prior to shipping flight PWB's to Sypris
- A copy of the report must accompany each shipment of PWB's
- **PWB's which arrive at Sypris without this report will be rejected and place in MRC and may cause delay in payment to supplier**
- Failed DPA will result in a Supplier SCAR being issued to the PWB manufacturer

U11 **PRINTED CIRCUIT BOARDS with unfilled via hole-in-pad technology:**

- Photos of micro-sections of via hole-in-pad must be provided by the PWB manufacturer for each manufacturing lot and shall be submitted to Sypris Electronics with each shipment
- Copper overhang is not allowed in blind via hole-in-pad.
- Via hole-in-pad must exhibit all the plating elements specified by the drawing.
- The conductive surface of the via in-hole pads must be free of contaminants that affect solderability, life, ability to assemble and serviceability
- Any deviations shall require advance Sypris Electronics approval.

U12 **PRINTED CIRCUIT BOARDS with filled via hole-in-pad technology:**

- Photos of micro-sections of via hole-in-pad must be provided by the PWB manufacturer for each manufacturing lot and shall be submitted to Sypris Electronics with each shipment.
- Add to all 0.006" micro via holes to be filled with copper and plate with gold. The allowable via fill depression is not to exceed 0.003". The allowable via cap plating shall have no voids, 0.0015" max separations and no more than 25% of the diameter of the pad. The via cap plating shall be at a minimum of 0.0003"
- Any deviations shall require advance Sypris Electronics approval.

U15 **PRINTED CIRCUIT BOARDS / NO COUPONS REQUIRED –** Printed Circuit Boards shall meet the requirements of the applicable specification as noted on the drawing. Each shipment of PCB's shall include:

- C of C (as defined in **C06**)
- Written results of micro-section inspection
- A sample thermal stressed micro-section for each date/lot code shipped
- Minimum plated copper in holes shall be .001" unless otherwise noted on drawing or specification
- PCB's shall meet the solderability requirements per ANSI/J-STD-003 Class 2
- A solderability sample for each date/lot code
- First article dimensional data for the first shipment of a new PCB or Rev. change
- Any deviations shall require advance Sypris Electronics approval

U17 **Data Retention** The PWB manufacture shall be responsible for retaining sample micro sections, coupons, and documentation for all items covered under this purchase order for a minimum of 7 years.

V02 **Traceability and Data retention** - Material used in this purchase order shall conform to all applicable purchase order requirements and shall be identifiable and traceable to records. The retention period is 7 years. Original or true copies of records related to purchase orders shall be available for review when requested by Sypris Electronics. These records must be retained in a suitable environment to prevent damage or deterioration.

V04 **Design Control -** No departures from the drawing and/or specification shall be made unless specifically authorized by Sypris Electronics

V10 **Traceability and Data Retention** - Material used in this purchase order shall conform to all applicable purchase order requirements and shall be identifiable and traceable to records. The retention period is **10** years. Original or true copies of records related to purchase orders shall be available for review when requested by Sypris Electronics. These records must be retained in a suitable environment to prevent damage or deterioration.

Z50 **LIMITED LIFE MATERIALS –** Items specified on this Purchase Order are shelf life limited and/or require temperature control. The supplier must identify the product as applicable with:

- C of C (as defined in C06)
- Manufacturing date
- Shelf life expiration date
- Lot/Date code
- Storage requirements

- **ALL MATERIAL WITH LIMITED SHELF LIFE SHALL HAVE A MINIMUM OF 80% OF THE AVAILABLE SHELF LIFE REMAINING ON THE DATE OF THE SHIPMENT TO SYPRIS ELECTRONICS**

Materials requiring refrigeration/freezer should **NOT** be shipped at a time that they would arrive on weekends or holidays

Space / Severe Environment Specific and additional Quality Requirements and Q-Codes

SQC01 **Certificate of Conformance (EEE components)** – In addition to the requirements of C06, each lot shipped shall be accompanied by the manufacturers (OEM) Certificate of Conformance. In addition:

- Certifications and/or test reports for all special processes **(if required by component drawing)** must be provided by the supplier or sub-tier suppliers and shall be appended
- Lot Code requirements:
  - **NO SINGLE DATE LOT DATE CODE OLDER THAN 4 YEARS IS ALLOWED**
  - Each item provided under this purchase order shall have a single lot/date code which is absolutely traceable to the supplier's shipment documentation and quality records.
- Material received with date codes older than FOUR (4) years without prior Sypris approval:
  - Will result in material rejected and sent to MRC
  - Will result in material being returned (via RMA) to the supplier
- Any deviations shall require advanced Sypris Electronics approval
- Sypris Electronics approval will require additional testing and/or analysis of older date code components, including, but not restricted to, performing solderability tests to verify compliance with NASA-STD-8739.2, Section 12.5.3 (for example)

SQC01M **Certificate of Conformance (Manufactured)** – In addition to the requirements of C06, each lot shipped shall be accompanied by the manufacturers (OEM) Certificate of Conformance. In addition:

- Each item provided under this purchase order shall have a single lot/date code which is absolutely traceable to the supplier's shipment documentation and quality records
- Each lot shipped shall be accompanied by the sub-tier suppliers' Certificate of Conformance(s) for all materials used in the manufacture of the identified components
- Certifications and/or test reports for all special processes must be provided by the supplier or sub-tier suppliers and shall be appended
- Any deviations shall require advance Sypris Electronics approval

SQC01H **Certificate of Conformance (Hardware)** – In addition to the requirements of C06, each lot shipped shall be accompanied by the manufacturers (OEM) Certificate of Conformance. In addition:

- Each Item provided under this purchase order shall have a single lot/date code which is absolutely traceable to the supplier's shipment documentation and quality records.
- If the supplier of the item is not also the manufacturer, the Certificate of Conformance of the manufacturer (containing manufacturer's traceability information) must also accompany the shipment.
- The traceability of the raw material (i.e. heat number / lot number) used to manufacture the item must be provided.
- Certifications and/or test reports for all special processes must be provided by the supplier or sub-tier suppliers and shall be appended.
- Any deviations shall require advanced Sypris Electronics approval.

SQC02 ESD & MSD Requirements -

- S20.20 ESD requirements are applicable for the manufacturing, handling, testing, and shipment of components.
- For Electrostatic discharge Sensitive Parts, the Supplier shall document and implement an auditable ESD Control Program.
- All ESD sensitive components shall be handled, packaged, marked and shipped to Sypris Electronics' in accordance with the requirements specified in ANSI/ESD-S20.20.
- Parts shall be packaged to prevent bending or damage to leads, seals, bodies at lowest level packaging.
- All parts shall be placed in conductive or static-dissipative packages, tubes, carriers, conductive bags, etc. for shipment.
- Packaging shall be clearly labeled to indicate that it contains electrostatic sensitive parts
- If the level of sensitivity falls below 100 volts, it must be clearly labeled as "ESD Class 0".
- Electrical parts that may be used or shipped in conjunction with ESD sensitive parts shall be treated as ESD sensitive
- All moisture sensitive components that are classified as being sensitive to moisture absorption shall be supplied in accordance with IPC/JEDEC J-STD-033A
- Any deviations shall require advance Sypris Electronics approval

SQC03 **Low Voltage Testing** – Low Voltage, Humidity Testing (LVHT)

- Third party humidity, steady-state, low voltage testing
- 12 each samples per lot are to be submitted for testing
- Required per MIL-PRF-123, Group B Inspection 4.6.16.1
- No failures permitted. Failures are cause for lot rejection and will not be accepted
- Test report is to be provided with the component receipt and must specify pass/fail determination
- Tested samples shall be returned to Sypris Electronics for review and retention

SQC04 **DPA** – Destructive Physical Analysis

- 5 each samples per lot are to be submitted for DPA
- Third party destructive physical analysis (DPA) required per MIL-PRF-123, section 4.6.11 group 2
- Test report is to be provided with the components receipt and must specify pass/fail determination
- DPA samples shall be returned to Sypris Electronics for review and retention

SQC05 **Sypris-Defined Class 0 Requirements** – In addition to an ESD control plan that is in accordance with ANSI/ESD S20.20, the supplier must handle components to Class 0 requirements as defined by Sypris Electronics. At a minimum, the following elements must comprise a supplier's Class 0 work area:

1) Grounded electrically dissipative work surface.
2) Certified continuous monitor wrist strap
2.1) Two (2) ESD Foot Straps must be worn at all times and evidence of testing must be available in accordance with ESD control plan ***
2.2) Supplier must have ESD static dissipative flooring in all areas where product will be handled
3) ESD Smock worn by all personnel in Class 0 area.
4) Certified air ionizer directed at ESD sensitive components.
5) Humidity monitored and controlled at or above 30%. (Processing of components must be halted if humidity falls below 30%.)

6) Control of static generators at work stations within one foot of ESD sensitive components.
7) Class 0 sign or placard in area or at work station indicating Class 0 ESD sensitivity.
8) When not being processed, ESD sensitive components must be stored in ESD protective package. (Product cannot be left unattended outside of ESD protective packaging.)

2.1 & 2.2 are new requirements for class 0 handling and Value Add Services

SQC06 **NASA-STD-8739.2 or J-STD-001ES** – The parts must be processed in accordance with applicable sections of NASA-STD-8739.2 or J-STD-001ES. Proper certification of personnel processing parts is required.

SQC07 **Solder Alloy Sn63Pb37, Solder Lot Traceability, RMA Flux (ROL0 or ROL1)**

- The parts must be tinned using solder alloy Sn63Pb37.
- The solder must meet requirements of J-STD-006.
- The manufacturer, part number and lot code of solder used for tinning parts must be documented and provided as part of data package to Sypris.
- Any flux used during tinning must meet the requirements of J-STD-004.
- Only RMA fluxes with activity levels of L0 or L1 are acceptable for use.

SQC08 **Co-Mingling of Lot/Date Codes Prohibited** – Multiple lot/date codes of a component part number cannot be placed onto the same reel. Each lot/date code must be segregated onto its own reel.

SQC09 **FLOWDOWN REQUIREMENTS**

This clause mandates that all applicable requirements that are invoked or applied to the customer's purchasing document, including this clause, shall be flowed down to the organization's sub-tier suppliers.

Appendix A
Goddard Space Flight Center (GSFC) DPA Submittal instructions

All printed wiring coupons shall be submitted to NASA/GSFC for analysis per the following requirement:

PWB coupon testing process:

- Prepare the coupon and attach complete “coupon submittal form”; send both to the GSFC address below.
- At time of shipment, email the “coupon submittal form” with shipper waybill number to:
  - GSFC: Rita.Rozenbaum-1@nasa.gov and cc
  - GSFC: frederick.berthiaume@nasa.gov for advance notification and tracking.
- GSFC material lab will contact the sender/POC if any discrepancy on the “coupon submittal form”.
- GFSC to track coupon testing, we anticipate a 2 weeks turn around. If required, instrument POC to request urgent status (1 week turn) to Fred Berthiaume
- GSFC material lab will email coupon test result to the POC indicated on the “coupon submittal form”.
- If anomaly on PWB coupon and it is desired to use the PWB, a material review board (MRB) meeting will be scheduled with the Instrument POC and MRB Team, GSFC Mission Assurance, Instrument Manager and/or designee and PWB experts. The MRB will disposition the anomaly.
- Additional Information:
  PWB coupon can be sent through shipper (FED EX or UPS) or hand carried only the coupon is needed we do not need the solder sample and the vendor’s evaluation puck. If the coupon is being sent, the sender shall email notice the day they send the items so we can watch for its arrival. The email should be directed to Rita Rozenbaum at Rita.Rozenbaum-1@nasa.gov and cc frederick.berthiaume@nasa.gov
  .
- The coupons can be addressed to:
  Rita Rozenbaum
  GSFC/NASA
  Mail Code 541 Bldg. 30 Rm. 181
  Greenbelt, MD 20771
  Tel: (301)286-8793
  Fax: (301)286-1646
  Email: Rita.Rozenbaum-1@nasa.gov

Please fill out the “coupon submittal form” to include:

- number of coupons being sent,
- Part Numbers
- Serial Numbers
- Date Code or Lot information
- vendor identification (CAGE)
- GSFC project
- any shipping/tracking information
- accurate indication of blind and buried vias is critical to accurate, timely testing of the coupons

It is necessary to know which procurement specification applies to the coupons; this information can be submitted with the coupons. If no specification is defined, we will assume that specification IPC 6012B Class 3/A applies.

E-mail addresses for those who should receive the e-mailed reports should also be supplied at this time. Supplier: please add the following email address to your request:

sypris.quality@sypris.com

The specifications require that all supplied coupons contain adequate identification. The military specification states that “as a minimum” coupon markings “shall reference the printed wiring board manufacturers’ CAGE (Commercial and Government Entity), lot date, and printed wiring board traceability code.” This is not a problem with most of our repeat vendors but it doesn’t hurt to tell them in advance that inadequate identification will result in the coupons being returned.

The coupons will be sectioned, poured in epoxy and ground and polished to observe various critical areas. One section from each coupon will undergo a thermal stress test by floating on top of a molten solder bath per the specification guidelines. The specification requires examination of one coupon for every panel of multilayer boards produced.

An e-mailed summary of the coupon examination will be supplied within two weeks from the starting date. The starting date for the coupon exam is the date upon which the coupons are in GSFC material laboratory. Email report of the findings will be sent to the originator/sender and GSFC distribution list. This report will include images of the causes for rejection if any are found.

Urgent status for coupons requires the approval on a case by case basis. This will result in a best effort turnaround.

PWB COUPON TEST REQUEST

GSFC Project: (instrument name)

Part Number		Serial Number	
Shipping Document		Quantity	
Mode of transport	Overnight ☐	Ground ☐	Hand Carry ☐

Number of board layers: _____ Laminate Materials: Core _____

_____ Prepreg _____

Coupons/boards contain: Blind vias ☐ Buried Vias ☐

Solid Cu vias ☐ Micro Vias ☐

Board Vendor Name		Date Code
FSCM (Cage)		
PWB Name		

Coupon Testing Reference Documents: IPC 6012B Class 3/A ☐

MIL-P-55110E ☐

IPC 6013 ☐

IPC 6018 ☐

Other ☐

Submitted by:

Name/Company:_____ **Contact:**_____

Telephone:

E-mail: _____

Email request and results to: sypris.quality@sypris.com

E-mail results to Instrument Point of Contact:

Email results to GSFC: roman.a.kilgore@nasa.gov frederick.berthiaume@nasa.gov

Robert.Launt-1@nasa.gov victor.v.dimarco@nasa.gov

jill.l.slater@nasa.gov Maryjane.B.Stephenson@nasa.gov

Charles.e.powers@nasa.gov

Send to:

Rita Rozenbaum

Code 541 Bldg. 30 Rm. 181

NASA/GSFC

Greenbelt, MD 20771

Phone Number: 301-286-8793

Fax Number: 301-286-1646

E-Mail: Rita.Rozenbaum-1@gsfc.nasa.gov

Appendix B
Pacific Testing Laboratories DPA Submittal instructions

All printed wiring coupons shall be submitted to Pacific Testing Laboratories for analysis per the following requirement:

PWB coupon testing process:

- Prepare the coupon and attach completed “Vendor Order Form” and “Test Report Email Distribution List”. Send coupons and documents to the Pacific Testing Laboratories.
  address below.
  .
- The coupons can be addressed to:
  Cathy Kingsbury
  Pacific Testing Laboratories
  29450 Avenue Tibbitts
  Valencia, CA 91355
  Tel: (661) 257-1437
  Email: Ckingsbury@pacifictesting.com

Please fill out the “Vendor Order Form” to include:

- Vendor Contact Name and Contact Information
- Testing Required*
- PWB Part number
- PWB Name
- Qty. of Coupons
- Date Code
- Serial Numbers
- Vendor identification (Name and CAGE Code)
- PWB Design Specification and Manufacturing Specification

*It is necessary to know which procurement specification applies to the coupons; this information can be submitted with the coupons. If no specification is defined, we will assume that specification IPC 6012B Class 3/A applies.

PACIFIC TESTING LABORATORIES, INC.
24950 Avenue Tibbitts, Valencia, CA 91355-3426, USA
TEL: (661) 257-1437
FAX: (661) 257-2411

NASA/GODDARD SPACE FLIGHT CENTER

* * GOES-R TESTING REQUIREMENTS * *

VENDOR ORDER FORM

*UPON COMPLETION OF TESTING SAMPLES WILL SHIP TO: NASA/GODDARD SPACE FLIGHT CENTER
MS 541, Bldg 30, Room 181
Greenbelt, MD 20771
ATTN: Helen Saulino

Vendor Information:

Company: Lockheed Martin Space Systems

Address: 3251 Hanover Street

City, State, Zip: Palo Alto, CA 94304-1191

Vendor Contact Name: _____

Phone Number & E-Mail: _____

Purchase Order #: _____

Testing Required:

Structural Integrity After Thermal Stress Microsection Examination IAW:

____IPC-6012B, Amendment 2 - CLASS 3/A

____IPC-6013, Rev/Amd____/____, Class 3

____ IPC-6018, Rev/Amd____/____, Class 3____ OR Class 3/A____

____Other : _____

Sample Identification:

Part Number: _____ PWB Name: _____

Qty Of Coupons: _____ System/Sub-System: _____

Date Code: _____ Serial Numbers: _____

PWB Manufacturer: _____ PWB MFR CAGE CODE: _____

PWB Design Spec: _____ PWB Manufacturing Spec: _____

PLEASE INCLUDE COPY OF MASTER DRAWING FOR INSPECTION PURPOSES

Form Date: 10/2014

Pacific Testing Laboratories, Inc.

PTL Contact:

Cathy Kingsbury (661)257-1437

Ckingsbury@pacifictesting.com

Test Report Email Distribution List:

NASA/Goddard:

Angela.M.Melito@nasa.gov

Frederick.E.Berthiaume@nasa.gov

Jill.L.Slater@nasa.gov

Gary.J.Franko@nasa.gov

MaryJane.B.Stephenson@nasa.gov

Lockheed Martin:

Huy.T.Nguyen@lmco.com

Cynthia.Topole@lmco.com

Joseph.J.Bronikowski@lmco.com

Sypris Electronics:

Mick.Dodge@sypris.com

Christopher.Alley@sypris.com

Sypris.quality@sypris.com

PWB Manufacturer/contract Manufacturer:

***Please include Additional Required E=Mail Addresses Below:**

_____

_____

_____

_____

_____

APPENDIX C
Q-Codes Specific to Space Flight Production (Turnkey)—Program EXS
(Based on document SSD-2000-02-020-04, Rev K.)

The following General Quality Requirements of QC-1, or applicable portions thereof, apply in addition to the specified Supplier Quality Requirement codes in the procurement documentation. Suppliers shall ensure that these requirements, or applicable portions thereof, are invoked on lower-tier suppliers of parts, materials, or services. Compliance with the provisions of these clauses does not relieve the supplier from the final obligation to provide acceptable supplies or services as specified in the procurement documentation.

When conflict exist between drawing requirements and Quality Requirement codes applied to that drawing, the drawing requirements shall take precedence unless otherwise specified.

Definitions:
- BUYER – Sypris
- SELLER - The legal entity that is the contracting party with the Buyer, with respect to the procurement documentation.

Part 1 GENERAL QUALITY REQUIREMENT CODES:

QC-1

A. PROHIBITED PRACTICES

Unauthorized Repairs: Seller may not repair by welding, brazing, plating, splicing, soldering, adhesives, or any other methods, items damaged or found to be faulty without Buyer's prior written approval.

CHANGE IN APPROVED DRAWINGS, PROCESSES, MATERIALS, OR PROCEDURES

Seller shall not change any drawing, process, material, or procedure without prior Buyer written approval, if such drawing, process, material, or procedure was originally approved by Buyer. Failure to notify the Buyer of these changes may result in rejection of the material.

Seller shall not change any process, material, or procedure from that used to qualify items or which was used by Seller to become a qualified source, without written approval by Buyer.

UNAUTHORIZED SUBMITTAL OF PRODUCTION

When the Procurement Document requires Buyer acceptance of a "first article," Seller shall not submit items from a production run for Buyer inspection before Buyer's acceptance of such "First Article."

NOTIFICATION OF FACILITY CHANGE

Seller shall not use or relocate any production, manufacturing, and/or processing facilities during performance of the work specified on the Procurement Document from those production, manufacturing, or process facilities approved by Buyer, without promptly notifying Buyer and affording Buyer an opportunity to examine such facilities for compliance with Quality Assurance requirements.

NONCONFORMING CONDITIONS

Final acceptance and formal disposition of all materials will be determined upon receipt at the Buyer's facility. The Seller, or lower-tier Suppliers, is not authorized to disposition Minor nonconformance's as "repair" or "use as is" unless Material Review Board (MRB) authority has been delegated. For this purpose, materials shall be defined as all parts, materials, components, or assemblies of the Seller or lower-tier Supplier. Nonconforming materials shall be segregated and withheld from shipment unless negotiated in advance. When authorized to ship nonconforming materials, the Seller shall ensure that the items are identified (e.g. tagged) and specifically referenced as being nonconforming in certification statements. The Seller shall notify the buyer, within 24 hours of identification, of nonconforming product that was inadvertently shipped to the Seller.

RESUBMITTAL OF REJECTED ITEMS

Items rejected by the Buyer and subsequently resubmitted to Buyer shall be clearly identified on Seller's shipping document as resubmitted items. Materials rejected by Buyer action shall not be reshipped without having corrective action plan being submitted and approved by Buyer prior to shipment.

B. MEASURING AND TEST EQUIPMENT

Seller shall be responsible for validating the accuracy and stability of tools, gages, and test equipment used to demonstrate that items conform to the Procurement Document. The level of accuracy shall be a minimum of 4 to 1 greater than the tolerance measured.

Documented schedules shall be maintained to provide for periodic calibration to adequate standards. Objective evidence of calibrations shall be recorded and made available for Buyer review.

C. DOCUMENTATION

The Buyer may refuse to accept items if the Seller fails to submit certifications, documentation, test data, or reports specified by the Procurement Document. Documentation includes Buyer Source Inspection reports when such Source Inspection is performed.

The preferred method to furnish actual dimension and test data is by electronic media (read-only format via CD or DVD). This media shall contain data of **ALL** parameters listed on the Purchase Order as well as dimensional data selected by the Seller to demonstrate product conformance. Data **MUST** reference, at a minimum, PO number, Part Number, Lot identification and Serial Number (if applicable) on media delivered.

D. DOCUMENT RETENTION

Records created by the Seller or distributor of products produced or delivered to the Buyer shall be maintained on file as specified below. Records include, assembly, test, inspection and verification/ validation data identifying conformance to each of the requirements specified in the referenced drawing and/or specification as applicable. Records shall be traceable to the Buyers purchase order number. All records and test samples shall be made available to the Buyer and/or Government/Regulatory Representative upon request.
Retention times as follows:

1. 5 Years
2. 7 Years (default, unless otherwise specified)
3. 10 Years or deliver records with material to Buyer for record retention
4. 15 Years or deliver records with material to Buyer for record retention
5. Records created by the supplier or distributor of products produced or delivered to Buyer shall be included with material delivered to Buyer as applicable.

If seller cannot meet selected retention time, then all records must be shipped to the buyer at time of shipment

.

Seller shall notify the Buyer 30 days prior to expiration of record retention time to allow for the retrieval of all records from Seller.

E. DISTRIBUTION OF DOCUMENTATION

Records include, assembly, test, inspection and verification/ validation data identifying conformance to each of the requirements specified in the referenced drawing and/or specification. Said records are also to include parts & materials data, certifications, inspection results, and are to be associated with the part or material manufacturer’s lot/batch number/and or date codes as well as the seller’s lot number. Records shall be traceable to the Buyers purchase order number.

F. BUYER SURVEYS, SURVEILLANCE, AUDITS, AND INSPECTIONS

The Buyer reserves the right to:

- Conduct surveys, audits, and surveillance of Seller's facilities or those of Seller's subcontractors or suppliers with prior coordination with Seller to determine the capability to comply, and to verify continuing compliance, with the requirements of the Procurement Document.

- Perform inspections at Seller's facilities or those of Seller's subcontractors or sub-tier suppliers with prior coordination with the Seller, during the period of manufacture and inspection prior to shipment.
- Establish a resident inspector at the Seller's facility.
- Use MIL-STD-1916 or equivalent sampling plans for the acceptance or rejection of items
- Waive the Buyer source inspection by notifying the Seller in writing.
- Make use of Sellers facility, documentation and instrumentation as required.

Buyer Source Inspection may include validation of Seller's automated test programs and procedures to Buyer's specification requirements and witnessing Seller's performance of acceptance tests/ inspections to Buyer's specification/ drawing. Seller may be required to perform additional acceptance test/ inspections when Seller's original acceptance test/ inspections have not been witnessed by the Buyer's Source Inspector. Buyer Source Inspection may also include review of lot qualification (groups B, C, or D) test data to Buyer specification requirements. After Buyer Source Inspection, any rework or test of the item, including any nonscheduled entry, such as removal of a panel, cover, or enclosure will void the source inspection. Seller shall provide all facilities, tools, instruments, gauges and support personnel, including office space, for Buyer to verify conformance to requirements.

Buyer in-process, source, and/ or surveillance inspection or tests shall not constitute final acceptance by the Buyer; nor shall it in any way replace the Seller's inspection/ test or otherwise relieve the Seller of their responsibility to furnish an acceptable end item. Final acceptance shall be at the Buyer's facility.

G. Deleted (Reference QP-15)

H. PACKAGING

Preservation, packaging, packing, handling, and shipment of items shall be in accordance with appropriate procedures to prevent damage and ensure that original quality is maintained. All electrostatic discharge sensitive material must be packaged in ESD-shielding in accordance with EIA-541.

1. Packaging constituents shall NOT contain amine based or ionic antistatic chemistry. Meaning no pink poly, no pink foam, or equivalent, etc.)
2. Packaging shall be designed to provide physical protection for device case and leads.
3. Use tape (& reel as applicable) or waffle pack as originally packaged from the Manufacturer for all electrical components, where applicable, in accordance with ESD (ANSI/ESD S541) or equivalent.
4. Bulk packaging or repackaging from bulk pack to tape or waffle pack is prohibited.

I. ELECTROSTATIC DISCHARGE CONTROL

Seller shall provide and maintain a program for electrostatic discharge control for all Electronic items furnished on this procurement.

Electrostatic discharge control shall be per ANSI/ESD S20.20. All electrostatic sensitive devices shall be packaged in static shielding packaging that meets the requirements of ESD STM 11.31,.ANSI/ESD S541.The Sellers ESD control program is subject to review and approval by the Buyer.

1. Leads shall be shorted together as appropriate using closed cell non sloughing conduction foam, packaged in sealed static shielding containers or bags designed for ESD protection. Each individual package shall include a destructible ESD precautionary label (ANSI/ESD S8.1 or Mil-STD. 129P), applied over the closure area of the packaging item.

J. CORRECTIVE ACTION REQUESTS

When a quality problem exists with Seller's items, Buyer may forward a Corrective Action Request to Seller. Seller shall respond to Corrective Action requests within 30 business days and must include the following information: analysis of the cause of the problem, statement of the action taken to prevent recurrence, and the effectively of the action. When corrective action is required in response to Government Source Inspection, Seller shall coordinate such action with the Government Quality Assurance Representative assigned to Seller's facility.

K. SPECIAL PROCESSES

When special process specification (ex. anodize, heat treat, plating, soldering, x-ray, cleaning, welding, or magnetic particle and penetrant inspection) are used, the seller shall have special processes approved by the buyer quality assurance, unless the special process supplier is NADCAP certified. The seller is responsible for maintaining a system to control such special processes whether performed at their facilities or at a lower-tier facility. The Seller shall perform systematic, periodic evaluation of personnel, equipment, methods, and material required in these special process to ensure positive control at all times. Objective evidence of these evaluations shall be made available to the Buyer upon request.

L. Deleted (Reference QD-1)

M. CONTAMINATION CONTROL

The Seller shall provide and maintain a program for contamination control approved by the Buyer. The Buyer retains the right to audit any of the Seller's CC procedures, documents, certifications, and clean room/clean bench environments. Requirements include, but are not limited to, meeting one of each of the following sets of standards.

- Federal Standard 209E and/or ISO 14644-2

Clean rooms and associated controlled environments – Part 2: *Specifications for testing and monitoring to prove continued compliance with ISO 14644-1*

- IEST-STD-CC1246D (formerly Mil.Std.1246D)

Product Cleanliness Levels and Contamination Control Program and/or JSC SN-C-0005D

N. Deleted (Reference QD-15)

Part 2 QUALITY SYSTEM REQUIREMENTS:

QS-1 QUALITY SYSTEM

The Seller shall maintain a Quality (or Inspection) System structured to the model provided by:

A. ANSI/ISO/ASQ-Q9001 or ISO 9001.
B. Software provided to the Buyer shall be developed in a controlled environment modeled after ISO 9001, ISO 9000, and/or ANSI/IEEE-STD-730.
C. SAE AS 9100
D. NHB 5300.4(1C)

QS-2 INSPECTION SYSTEM

Seller shall provide and maintain an inspection system that is in conformance with the model provided by:

A. NASA Publication NHB 5300.4 (1C), "Inspection Systems Provisions for Aeronautical and Space System Material, Parts, Components, and Services."

B. MIL-I-45208, "Inspection System Requirements."
C. MIL-STD-1520, "Corrective Action and Disposition System for Nonconforming Material."
D. MIL-STD-45662, "Calibration Systems Requirements," ISO 10012-1/ ANSI/NCSL-Z 540-1.
E. Military Specification "Software Quality Assurance Program Requirements."
F. ISO/IEC-17025 General Requirements for the Competence of Testing and Calibration Laboratories.

QS-3 Deleted

QS-4 DEFENSE SYSTEM SOFTWARE DEVELOPMENT - AS9100

A. Seller shall provide and maintain a software development program, which is in conformance with AS9100B - Quality Management System Aerospace Requirements.
   - CMMI Maturity Level 3, for Systems Engineering / Software Engineering Version 1.1, Stage or Continuous Representation

B. Seller shall provide and maintain a software development program, which is in conformance with DOD Standard DOD STD-2167, "Defense System Software Development."

QS-5 Deleted

Part 3 QUALITY INSPECTION REQUIREMENTS:

QI-1 GOVERNMENT SOURCE INSPECTION (NASA)
All work under this procurement is subject to inspection and test by the Government at any time and place. The Government representative who has been delegated NASA Quality Assurance functions for this procurement shall be notified immediately upon receipt of this Procurement Document. The Government representative shall be notified three (3) working days in advance of the times the items are ready for inspection or test. In the event the Government representative cannot be contacted, Buyer shall be notified immediately. The Seller, without additional charge, shall provide all reasonable facilities and assistance for the safety and convenience of the Government representatives in the performance of their duties.

QI-2 GOVERNMENT SOURCE INSPECTION (DOD)
Government Source Inspection is required prior to shipment from Seller's facility. Upon receipt of this Procurement Document, Seller is required to immediately notify and provide a copy of the Procurement Document(s) to the Government representative who normally services the Seller's facility so that appropriate planning for Government Inspection can be accomplished. If a Government representative does not normally service the Seller's facility, the nearest Army, Navy, Air Force, or Defense Supply Agency Inspection office shall be contacted. In the event the Government representative cannot be contacted, Buyer shall be notified immediately. The Seller, without additional charge, shall provide all reasonable facilities and assistance for the safety and convenience of the Government representative in the performance of their duties.

QI-3 BUYER SOURCE INSPECTION
Inspection by Buyer must be performed at Seller's facility or at the Seller's subcontractor prior to shipment. Seller shall notify Buyer's Procurement or Quality Organization representative not less than five (5) working days prior to the time that items are ready for Buyer Source Inspection. Evidence of source inspection shall be included with shipment.

QI-4 BUYER IN-PROCESS INSPECTION
Items will be inspected by Buyer Source Inspection during manufacture at one or more of the following:
- Defined machining steps
- Prior to cleaning
- Prior to plating
- Prior to assembly close-up
- Prior to encapsulation/ conformal coating
- Other points specified in the Procurement Document.

Seller or agent of seller shall notify the Buyer's Procurement or Quality Organization representative not less than five (5) working days prior to the time that items are ready for Buyer inspection. Evidence of in-process inspection shall be included with shipment.

QI-5 FIRST ARTICLE INSPECTION
First Article Inspection Report(s) must meet the requirements of SAE AS9102, latest Revision or equivalent approved by the Buyer.

First Article Inspection (FAI) or test shall be accomplished at the Seller's facility prior to initial shipment. The Seller shall submit the completed FAI documentation package to the Buyer at least ten (10) working days prior to Source inspection for Buyer review and approval. One copy of the approved FAI report shall be forwarded with the FAI article.

The record of this inspection is to include all characteristics and requirements specified by the engineering drawing(s) or other design media, including notes and specifications. A first article report must be included with the first shipment of any parts that require a new or updated First Article Inspection.

This FAI package shall include the completed First Article Inspection Report on the AS9102 forms or approved equivalent forms, a completed Certificate of Conformance and all supporting material and process certifications. Also include a copy of all nonconformance's documented with the Buyer approvals, if applicable.

Note: When completing a FAI package for an assembly, the Certificate of Conformance will refer to all of the detail part numbers and standard hardware used in constructing that assembly. Each detail part number will have its own complete FAI package approved prior to the assembly's FAI package. The approved Certificate of Conformance for each detail part number shall be included with the FAI package for the assembly.

QI-6 Deleted (Reference QC-1F)

QI-7 Deleted (Reference QP-17I)

QI-8 BUYER PRECAP INSPECTION

Items on this procurement require precap inspection by the Buyer Source Inspector subsequent to 100 percent precap visual inspection performed by the Seller. Seller shall notify the Buyer's Procurement or Quality Organization representative not less than five (5) working days prior to the time that the items are ready for inspection. Evidence of precap inspection shall be included with shipment.

QI-9 Deleted

QI-10 Deleted

QI-11 Deleted (Reference QI-1 and QI-2)

QI-12 GOVERNMENT/NASA ACCESS

During performance on this order your quality control or inspection system and manufacturing processes are subject to review, verification and analysis by authorized Government/NASA /Regulatory representatives. Government/NASA inspection or release of product prior to shipment is not required unless you are otherwise notified. This will be done at no cost to the Buyer.

A. Buyer requires right of access to supplier facility. Quality control or inspection system and manufacturing processes are subject to review, verification and analysis by authorized Government/NASA /Regulatory representatives. Government/NASA inspection or release of product prior to shipment is not required unless you are otherwise notified.

QI-13 MATERIAL REVIEW BOARD (MRB)

MRB authority is **NOT** delegated: Nonconforming product requires Buyer approval via a documented Waiver prior to shipment.

QI-14 MECHANICAL INSPECTION

Visual inspection shall be aided by magnification between 4X and 7X. Additional magnification shall be used as necessary to resolve suspected defects.
100% inspection of all surfaces is required.

Part 4 PROCESS CONTROL REQUIREMENTS:

QP-1 SPECIAL PROCESS CONFORMANCE

Supplier and any sub-tier supplier engaged in special processes (ex. Anodize, heat treat, plating, soldering, x-ray, cleaning, welding, or magnetic particle and penetrant inspection) shall have special processes approved by the buyer quality assurance, unless the special process supplier is NADCAP certified. A copy of the NADCAP certification and certificate or conformance to the special process shall be supplied with order.

QP-2 BUYER SEM ANALYSIS

Buyer approval of Scanning Electron Microscope (SEM) Analysis is required for wafer lots to be incorporated in parts supplied to Buyer. The SEM Analysis shall be performed by Seller and must be approved in writing by Buyer prior to incorporation of wafers in parts.

QP-3 Deleted

QP-4 CONTROL OF TEST SOFTWARE

Seller shall provide and maintain a system for control of software used in the qualification/ acceptance testing on this procurement. Seller shall maintain procedures and test records on items delivered to Buyer, and test records shall be available for Buyer review.

QP-5 DESTRUCTIVE PHYSICAL ANALYSIS

Destructive Physical Analysis (DPA) is required. The Seller shall provide destructive physical analysis for this lot of parts.

A. Buyer approval of Seller's DPA procedure is required prior to implementation. If Seller chooses to have the analysis performed by an outside supplier, Buyer approval of that supplier is required.
B. Buyer approval of the lab to be used for the DPA is NOT required.
C. The DPA must be done by an independent third party lab which is DSCC certified to perform DPAs on this part commodity. The DPA must be done according to the requirements of MIL-STD-1580 (current revision). A comprehensive DPA report must be supplied as part of the delivered data package for the shipped parts.
D. The sample quantity shall be those designated as the quantity of parts listed on an RFQ / PO line as "Samples for DPA."
E. DPA shall be done in accordance with the Buyers Source Control Drawing.

QP-6 SOLDERING (for previous version, reference QP-6B)

A. Soldering shall comply with NASA Standard 8739.2. Requirements for Surface Mount.
B. Soldering shall comply with NASA Standard 8739.3. Requirements for Soldered Electrical Connections.
C. Soldering shall comply with IPC-A-610C Class 3
D. Soldering shall comply with IPC J-STD-001D
E. Other Standards as approved by Buyer

QP-7 Deleted (Reference QP-6C)

QP-8 Coupon Requirements (PWBs – Rigid and Flex)

A. The Seller shall provide one coupon from each printed wiring board panel with each shipment. Unless otherwise specified, the test specimens shall be processed at the same time and conditions and traceable for each uniform lot or batch processed.
B. Coupons requirements shall conform to the requirements of Buyer's specification.

QP-9 PWB/Flex Circuit Requirements

Printed wiring boards shall be constructed and tested in accordance with:

A. MIL-PRF-31032 (Rigid and Flex) or MIL-PRF-55110
B. MIL-P-50884
C. IPC 6010 Series:
    1. IPC 6010
    2. IPC 6011
    3. IPC 6012
    4. IPC 6013
    5. IPC 6014
D. Buyers drawing 8147294
E. Buyers drawing 8193759

QP-10 Marking Permanency (for previous version, reference QP-10a)

A. Each part must meet solvent resistance requirements per MIL-STD-202 Method 215.
B. Semiconductors must meet the marking permanency requirements of MIL-STD-750 Method 1022.5
C. Microcircuits must meet the marking permanency requirements per MIL-STD-883 Method 2015.13

QP-11 Microcircuit and Semiconductor Dice Evaluation

A. Microcircuit dice supplied on this order shall be shipped with lot-specific wafer identification along with summary data for all required M/883 wafer lot qualification tests and inspections. All information shall be provided as part of the data package supplied with the parts.

B. Microcircuit dice supplied on this order shall be shipped with additional testing and inspections as specified in TOR-2006(8583)-5236, latest revision, Table 960-1 All Subgroups. Summary test results for the lot to be shipped to the Buyer shall be provided for all subgroups in Table 960-1 as part of the data package supplied with the parts.

C. Semiconductor dice on this order shall be shipped with lot-specific wafer identification along with summary data for all wafer lot qualification tests and inspections. All information shall be provided as part of the data package supplied with the parts.

D. Semiconductor dice on this order shall be shipped with additional testing and inspections as specified in TOR-2006(8583)-5236, latest revision, Table 960-2 All Subgroups. Summary test results for the lot to be shipped to the Buyer shall be provided for all subgroups in Table 960-1 as part of the data package supplied with the parts.

E. Dice geometry shall be supplied with each lot shipment.

F. Element evaluation is to be performed in accordance with Buyer specification provided for each manufacturer's wafer lot.

QP-12 Passive Element Evaluation for Hybrids and Assemblies

All required test information and data below shall be provided as part of the data package supplied with the parts.

A. All passive elements shall meet the evaluation requirements of MIL-PRF-38534, Appendix C.

B. Ceramic chip capacitors shall be M123 per MIL-PRF-123.

C. Chip resistors shall be M55342 at FR T per MIL-PRF-55342.

D. Discrete semiconductors shall be JANKC or JANS according to MIL-PRF-19500.

E. Monolithic microcircuits shall be QML V or JAN Class S according to MIL-PRF-38535.

F. Silicon substrate, metal element, chip resistors, with wire bond terminals must be compliant with MIL-PRF-55342. The only exception to this is Power Conditioning; which may be done, with Buyer approval of sample size, on a sample basis.

G. Hybrid packages shall be hermetic and meet all MIL-PRF-38534 package requirements.

H. Any hybrids contained as elements of a hybrid or assembly ordered from the Seller shall meet all of the requirements of this Quality Code.

I. Any alternates to the parts specified above, and parts of types not covered above, require Buyer approval and processing according to the tables in TOR-2006(8583)-5236, latest revision, section 960.

J. The use of commercial parts is strongly discouraged. Buyer approval of such parts will require strong technical justification and a strong quality assurance / reliability assurance plan from the Seller. The judgment as to the efficacy of the aforementioned justification and plan rests solely with the Buyer.

K. A complete As-Designed EEEE Parts list shall be provided to the Buyer for approval before purchasing or parts or hybrid / assembly build begins.

L. A complete As-Built EEEE Parts list shall be provided to the Buyer with the data pack shipped with the finished hybrids or assemblies.

M. Passive elements supplied on this order shall conform to the requirements of Buyer's specification.

QP13 Hybrid Package and Cover Evaluation

A. Hybrid packages and covers supplied on this order shall conform to the requirements of MIL-PRF-38534.
B. The Buyer shall be notified of all design or construction changes by the Seller, prior to shipment of material to the Buyer. Failure to notify the Buyer of these changes will result in rejection of the material.

QP-14 Deleted

QP-15 Time and/or Temperature Sensitive Material

Time and/or Environment (Temperature, Humidity, Barometric Pressure, Ambient Light, other) Sensitive Material must be identified with the following information on the outside of the shipping container and the lowest level packages containing the material:

- Storage Requirements (Temperature, Humidity, Barometric Pressure, Ambient Light, other) as applicable to the item.
- Shelf life (expiration date) at stated storage conditions.

A minimum of 75% of the shelf life period must be remaining at the time of receipt at the Buyer's ship to address.

QP-15A Time and/or Temperature Sensitive Material

Time and/or Environment (Temperature, Humidity, Barometric Pressure, Ambient Light, other) Sensitive Material must be identified with the following information on the outside of the shipping container and the lowest level packages containing the material:

- Date of Manufacture
- Storage Requirements (Temperature, Humidity, Barometric Pressure, Ambient Light, other) as applicable to the item.
- Shelf life (expiration date) at stated storage conditions.

A minimum of 75% of the shelf life period must be remaining at the time of receipt at the Buyer's ship to address.

Any material which will have six (6) months or less of shelf life when received at the Buyer's ship to address, shall be boldly and obviously marked as "Short Life Material" on the outside of the shipping container and on the lot documentation shipped with the material. Date of Manufacture

QP-16 Traceability Documentation

Traceability documentation shall be provided to the following requirements:

A. MIL-PRF-19500 (Semiconductors)

B. MIL-PRF-38534 (Hybrid Microcircuits)

C. MIL-PRF-38535 (Microcircuits)

D. Manufacturer's heat, lot, or batch number and the Buyers Purchase Order number shall be included with the material.

QP-17 Data

Each deliverable device shall be supplied with the following:

A. Attributes data for all screening tests.

B. Variable data for all burn-in and operations life tests.

C. Lot specific final electrical parameter test data.

D. Data specified in the referenced drawing.

E. Objective evidence of current acceptable Group B, C, D and E (if radiation data is available) testing.

F. Each deliverable device shall be supplied with the following: Lot specific data necessary to prove compliance to all electrical performance and Group A testing requirements of the specification. Summary reports of all screening tests performed and Group B, C, D and E (if radiation data is available) as required by the governing specification including dated indication of completion and compliance.

G. Provide test measurement data (actual readings) covering the functional parameters of the referenced drawing and/or specification.

H. Electronic x-ray or film (Approved by Buyer) must as a minimum be annotated with :
- Part Number
- Part Serial Number(s)
- Identification of the area photographed
- Identification of the view direction

Radiographic/Photographic film shall be interpreted by the buyer approved facility and the findings documented in a written report. The radiographic report shall include at a minimum
- Name and location of the radiographic facility performing the inspection
- Radiographic/photographic specification or procedure used
- Quantity of parts inspected
- Quantity of parts accepted
- Quantity of parts rejected and reason for rejection.

QP-18 Solderability for previous version, reference QP-18a

A. Each part must meet solderability requirements per MIL-STD-202 Method 208.
B. Semiconductors must meet the solderability requirements of MIL-STD-750 Method 2026.11
C. Microcircuits must meet the solderability requirements MIL-STD-883 Method 2003.8

QP-19 Qualified Products List (QPL)

If a Qualified Products List (QPL) exists for the items to be supplied under this purchase order, the items must have been previously qualified and the manufacturer's name or symbol must appear in the QPL. The manufacturer's name or symbol must also appear on the item supplied or within the associated shipping container. Qualification data shall be made available to Buyer upon request.

QP-20 Lot Acceptance Coupons

The Seller shall provide representative Surrogate Test Coupons and/or Qualification Test Articles as defined by the Buyer provided drawings and/or instructions for the purpose of process qualification and/or lot acceptance. Unless otherwise specified, the test specimens shall be processed at the same time and conditions and traceable for each uniform lot or batch processed.

QP-21 Non-optimized Process Requirements for Microcircuits purchased as MIL-PRF-38535 Class V:

A. Non-optimized, Static Burn-in according to MIL-PRF-38535, is required on a 100% screening basis for the lot of parts being purchased. Summary results shall be included with the data package shipped with the lot of parts.

B. Non-optimized, Internal Visual according to MIL-PRF-38535, is required on a 100% screening basis for the lot of parts being purchased. Summary results shall be included with the data package shipped with the lot of parts.

C. For CMOS parts: Both pre and post burn-in QIdd measurements shall be read and recorded for all parts in the lot at 25 °C. The Delta QIdd shall be calculated for each part in the lot and reported as part of the

D. Serialized final test results included with the data package shipped with the lot of parts.

E. Non-optimized, Gross Leak testing according to MIL-PRF-38535, is required on a 100% screening basis for the lot of parts being purchased. Summary results shall be included with the data package shipped with the lot of parts.

F. Non-optimized, Final electrical testing shall be performed at three (3) temperatures (Minimum, 25°C, and Maximum) according to MIL-PRF-38535, is required on a 100% screening basis for the lot of parts being purchased. Read and record, serialized, results shall be included with the data package shipped with the lot of parts.

G. Non-optimized, internal water vapor testing shall be performed on 3 pieces from the part lot being purchased according to MIL-PRF-38535. Summary results shall be included with the data package shipped with the lot of parts.

Part 5 DOCUMENTATION:

QD-1 CERTIFICATE OF COMPLIANCE (from original manufacturer)

A Certificate of Compliance is required with each shipment.
Certifications shall include:

- Manufacturer's Name
- Manufacturer’s Address (where part or material is made)
- Manufacturer’s cage code (if applicable)
- Part Number or identification as shown on the purchase order
- Part Number Revision (if applicable)
- Purchase Order Number
- Serial Number (if applicable)
- Manufacturer's heat, lot, batch number/date code
- Expiration and/or cure date (if applicable)
- Special process and inspection/specification (including revision number) numbers as applicable.

Certifications must be signed by an authorized agent of the Seller. If it is an electronic certification, an electronic signature is required from an authorized agent of the Seller.

Buyer may refuse delivery of items if Seller fails to submit with each shipment all documentation specified here-in.

QD-2 CERTIFICATE OF PHYSICAL ANALYSIS

A Certificate of Physical Analysis shall be required with each shipment of material. The certificate shall identify the material by reference to the

- melt
- cast
- heat
- drop
- lot

or other similar designation and must indicate the applicable specifications, revision, and Purchase Order number as well as Physical Analysis data.

QD-3 CERTIFICATE OF CHEMICAL ANALYSIS

A Certificate of Chemical analysis shall be required with each shipment of material. The certificate shall identify the material by reference to the

- melt
- cast
- heat
- drop
- lot

or other similar designation and must indicate the applicable specifications, revision, and Purchase Order number as well as Chemical Analysis data.

QD-4 Deleted (Reference QD-7)

QD-5 Deleted (Reference QS-2)

QD-6 BUYER SUPPLIED MATERIAL CERTIFICATE

The Seller shall provide a Certificate with each shipment of product. This Certificate shall indicate the batch, lot, date code, or other pertinent traceability data of Buyer supplied materials contained in the shipment.

QD-7 RAW MATERIAL DOCUMENTATION REQUIREMENTS

The Seller shall provide a Certificate of Conformance with each shipment of product. This Certificate shall indicate the batch, lot, date code, or other pertinent traceability data of supplied materials contained in the shipment.

A. Shipment of metallic or non-metallic raw material shall be accompanied by a manufacturer's test report for the raw material containing:
   - Name and location of raw material manufacturer or mill
   - Material identification by specification number and material condition
   - Manufacturer's mill lot identification number or batch number or heat number of the raw material
   - Actual chemical and physical property test results as specified in the applicable specification.

B. Shipment of finished or semi-finished items manufactured from metallic or non-metallic raw materials shall be accompanied by manufacturer's test reports containing:
   - Name and location of raw material manufacturer or mill
   - Material identification by specification number and material condition
   - Manufacturer's mill lot identification number or batch number or heat number of the raw material.
   - Actual chemical and physical property test results as specified in the applicable specification.

C. Shipment of finished or semi-finished items manufactured from metallic or non-metallic raw materials shall be accompanied by a certification from the Seller containing:
   - Name and location of the manufacturer(s) of the raw material(s), lot number(s) or mill lot identification number(s) or heat number(s) of the raw material(s) used in the manufacture of the finished or semi-finished item(s)
   - Statement that the raw material(s) used in the manufacture of the finished or semi-finished item(s) meets applicable specification requirements.

D. D. Shipment of finished or semi-finished items manufactured from metallic or non-metallic raw materials shall be accompanied by manufacturer's test reports containing:
   - Name and location of raw material manufacturer or mill.
   - Material identification by specification number and material condition
   - Manufacturer's mill lot identification number or batch number or heat number of the raw material.

QD-8 SELLER INSPECTION REPORTING REQUIREMENTS

A. Seller is required to submit with each shipment of items one copy of an inspection report reflecting 100 percent inspection (of all drawing characteristics for each part in the order). Seller shall inspect and report on everything called out on the drawing characteristics.

Items with a total tolerance >.010" or threaded features, shall allow, at the manufacturer's discretion, the use of an attribute gauge for inspection. If an attribute gauge is used the manufacturer may record the dimension as "OK" or acceptable in the inspection report.

The report shall delineate each drawing characteristic, location (sheet and zone), tolerance, and specify actual measurement results for all drawing characteristics including all out-of-tolerance conditions. The only exception to the above procedure applies to items machined under tape control or automated conditions.

The inspection data shall be keyed to unique serial numbers assigned to each item (check the Purchase Order for pre-assigned serialization). Serial numbers shall be affixed to each item with a tag and are not to be physically scribed or stamped into the items unless directed by the Buyer, PO, or drawing.

Suggested report format is as follows:

Dimension	Tolerance	DWG	Location	S/N 001	S/N 002
0.250	+0.005 - 0.005	Sheet 1	CC	0.251	0.253
0.250	+0.010 - 0.000	Sheet 1	CC	0.259	0.253
0.250	+0.010 - 0.010	Sheet 1	CC	0.257	0.263

B. Seller is required to submit with each shipment of items one copy of an inspection report reflecting all drawing characteristics as required in QD-8A. This report shall be limited to the first, middle and last item produced from one continuous set-up; and the inspection report shall state the items were machined under tape controlled, automated conditions, or if a batch assembly process was used. If a sampling plan is specified by the Buyer's drawing, inspection of a lot to that sampling plan is allowed. The document number of the sampling plan and relevant sampling plan information used shall be recorded on the inspection report. When no sampling plan is specified by drawing and seller is a distributor of catalog parts (i.e., connectors, pins, sockets, plugs, screws, nuts, bolts etc.), inspection of the first and last packaged is allowed

C. Superseded by QD-8A

D. Superseded by QD-8B

E. Same as QD-8A, however, the only documented drawing characteristics required on the inspection report are those characteristics and notes identified as Critical to Function (CTF) and any other nonconforming dimensions. Supplier is responsible for compliance to dimensions and notes on the drawing

F. Provide normal inspection/test data covering parameters identifying conformance to the requirements of the referenced drawing and/or specification

G. Provide test measurement data (actual readings) covering the functional parameters of the referenced drawing and/or specification.

H. Provide dimensional measurement data (actual readings) for each part in this order, covering the mechanical parameters of the referenced drawing and/or specification.

QD-9 Deleted

QD-10 Test Data

When Buyer specifications require test data to be recorded during performance of acceptance testing, a copy of the recorded data, showing evidence of Seller's inspection and verification of conformance, shall accompany shipment of items to Buyer. Data shall meet the format requirements of the Buyer's specification and, as a minimum be identified with:

- Buyer Procurement Document number and change notice b
- Buyer specification/drawing number and revision letter
- Buyer engineering order(s)
- Part number
- Type of test performed
- Lot numbers, serial numbers, date codes of items tested
- Total quantity tested, quantity accepted, and quantity rejected
- Any codes, keys, or other information necessary to interpret Seller's data.

QD-11 SOFTWARE DELIVERY DOCUMENTATION

Seller shall deliver documentation of software as specified in the Procurement Documents. Software documentation shall be sufficient to establish that:

- All requirements are achieved
- Configuration is correct and deliverables are properly identified and marked
- Planned level of acceptance is achieved and/ or deviation/ waivers are made part of the deliverable package
- Operating instructions accompanying the developed software which are sufficient to enable loading initialization, and operation by Buyer.
- Software Version Description Document, which includes, any known problems, target system configuration requirements, build/installation instructions and change history
- Contain ITAR marking (if applicable)
- Compliant to Data Item Description (DID) contents and format per contract

QD-12 Deleted (Reference QC-1A and QI-13)

QD-13 REQUIREMENTS FOR DISTRIBUTORS

The Distributor (a Seller other than the manufacturer) shall identify:

- Manufacturer
- Manufacturing plant location or cage code (if applicable)
- Manufacturer's part number
- Manufacturer's lot or batch number
- Lot date code (if applicable) for each item under the procurement.

QD-14 Deleted

QD-15 MATERIAL SAFETY DATA SHEETS (MSDS)
The Seller must provide the applicable material safety data sheets with the product shipment.

QD-16 HEAT TREATMENT OVEN CHARTS
The supplier shall supply heat treatment oven charts for all heat treatments specified in the procurement documentation and referenced drawings. Oven charts shall include reference to oven used, date of heat treatment, starting time, and definition of pen scales used to record times and temperatures.

QD-17 DEVICE PKG
Packaging constituents shall not contain amine based or ionic antistatic chemistry – meaning no pink poly, no pink foam, or equivalent, etc. It is required that packaging for all electrostatic discharge sensitive material must be packaged in ESD-shielding in accordance with EIA-541. Packaging shall be designed to provide physical protection for device case and leads.

Use tape (& reel as applicable) or waffle pack as originally packaged from the Manufacturer for all electrical components where applicable, in accordance with ESD (ANSI/ESD S20.20) or equivalent.

Bulk packaging or repackaging from bulk pack to tape or waffle pack is prohibited. In lieu of bulk packaging, parts can be individually packaged.

HZ-01 HAZARDOUS MATERIAL (CERTIFICATE OF CONFORMANCE)
A separate statement on the Certificate of Conformance (C of C) shall certify that all external Beryllium or Beryllium Composite surfaces meet the cleanliness levels of < (less than) 25 micrograms (ugms)/sq.ft. as specified by the Brush Wellman specification, before the shipment of parts to Buyer or its customers.

HZ-02 HAZARDOUS MATERIAL (WARNING LABEL)
ALBEMET or any other Beryllium Composite Material or fabricated parts being shipped to Buyer or its customers shall have warning label attached externally to each individual package containing such subject parts.

Part 6 MISCELLANEOUS PO NOTES:

001 PO NOTE 001
For Spaceflight Use.

523 PO NOTE 523
Inner Layer CSI is not required if Automated Inner Layer Inspection is accomplished via a buyer approved process (PQE must approve). Detailed results must be provided for review at final CSI, and be included with associated delivered product.

524 PO NOTE 524
Low outgassing materials must be used on this order. Materials must meet the following criteria: Not to exceed 1.0% TML and 0.1% CVCM, per ASTM-E-595; unless expressly approved by buyer.

526 PO NOTE 526
Tantalum capacitor surge current testing solid tantalum electrolytic capacitors shall be 100% surge current tested as follows: capacitors shall be subjected to ten consecutive cycles at both -55 degrees and +85 degrees. The applied voltage shall be rated dc voltage +/- 2% with an energy storage bank of 50000 microfarad (mf) minimum across the output terminals. The charge and discharge time shall be 4 seconds, and the total dc resistance of the wiring and connections shall be 1 ohm +/-.2 ohms, including the impedance the power supply. Capacitors shall meet the capacitance, DF, and DC leakage after test.

538 PO NOTE 538
Packaging requirement: Printed Wiring Boards must be enclosed in Static Intercept brand Polyethylene Bags available from Engineered Material Inc, 113 McHenry Road, Suite 179, Buffalo Grove, IL 60089, (708) 215-1725. Each PWB shall be in a separate bag with desiccant included in packaging. Either flat bags or zipper closure are acceptable.

544 PO NOTE 544
All parts supplied to this Purchase Order must be from the same lot date code.

545 PO NOTE 545
Substances, chemicals, materials & parts required by this PO/subcontract may be subject to US Gov't, state, or local regulations, statutes, or similar requirements for the handling, processing & transportation of Mercury, Beryllium, PCBs, Radioactive materials, Cyanide & Arsenic. By accepting this order, Seller certifies they are in compliance with all such regulations & statutes. Prior to shipment or delivery of any items which contain or incorporate any of the above materials, Seller shall notify Buyer of delivery, provide a completed MSDS or equivalent and include a copy with each order.

561 PO NOTE 561
This Purchase Order requires that all applicable including key characteristics where applicable, be flowed down to all sub-tier suppliers.

562 PO NOTE 562
The applicable revision of all specifications, tests, practices, guides, technical bulletins, etc., associated with this order is the revision in effect at the Purchase Order/Last Supplement date. Unless otherwise noted in the requirements, refer to http:/www.techstreet.com/tracking/track_instruct.tmpl for document revision information.

573 PO NOTE 573
Pre-wired connectors supplied on this purchase order shall be manufactured after the purchase order issue date. Buyer-supplied static intercept bags will be used for packaging. Shipment shall occur immediately after source inspection acceptance via overnight delivery.

574 PO NOTE 574
This purchase order includes a statement of work (SOW) that defines all of the requirements for this procurement. The SOW includes at a minimum; The deliverable hardware, software, and documentation required, program management oversight expected, product assurance provisions required, and the testing/acceptance criteria.

575 PO NOTE 575
The following metals shall not be used: all forms of pure Zinc, Cadmium, Mercury, Selenium, all forms of pure tin (purity >97%), and Reflowed Tin. Alloys containing Cadmium, Zinc, Mercury, or Selenium in concentrations greater than 15% (Purity>15%) shall not be used unless inside a hermetically sealed device or in a Space Proven Detector Device. In addition, the following plating shall not be used: Silver Plated Copper Wire with less than 40 micro inches of Silver Plate, Gold Plating over Silver or Copper without a Nickel Barrier for Electrical Contacts, and Zinc plating without an overcoat of a suitable flight approved metal. All parts shall be physically verified for this condition and documentation of the verification shall be provided the buyer. Single parts with no internal elements will be verified at buyer’s incoming inspection and will not require verification by supplier.

576 PO NOTE 576
All Quality Notes (QC-X, QS-X, QI-X, QP-X, QD-X) incorporated in this order are defined in Appendix C of Sypris’ Q-Codes listing.

578 PO NOTE 578
The parts procured on this PO require the supplier to provide a destructive physical analysis (DPA). The DPA is to be performed per S311-M-70, using the sample size identified in the PO. The DPA must be performed by an independent lab approved by buyer. The DPA is to include RGA testing, where applicable, on at least one part, and include screening for prohibited materials per note 575.

580 PO NOTE 580
The parts supplied to this P.O. shall be from Date Code less than 5 years old from the date of receipt.

586 PO NOTE 586
Material test report required: a document produced by the fastener manufacturer that certifies information required and includes fastener lot number, manufacturing date, lot quantity, raw material heat number, chemical composition and mechanical and metallurgical test results (as required in QD-7B). The following products are exempt from these requirements: washers, spring pins, cotter pins, retaining rings, cable ties, safety wire, O-rings, springs, Velcro and nonmetallic fasteners.

589 PO NOTE 589
Product Assurance and Documentation Requirements/Deliverables shall be per applicable Source Control Drawing (SCD)

592 PO NOTE 592
The following materials shall not be used: Active Rosin and Organic Acid Fluxes on closed surfaces, Magnesium and Magnesium Alloys unless coated, PVC, Compounds prone to Reversion, Silicone Greases, Radioactive Materials, Polymide Insulated Copper/Copper Alloy Wire, TFE Insulated Hook Up Wire, Materials that release Acetic Acid, Cyanoactylate Adhesives, Graphite as a filler for Lubricants or Greases. All Parts shall be verified for this condition and documentation of the verification shall be provided to buyer.

593 PO NOTE 593
PIND testing required for microcircuit devices with cavities, when it is not performed during standard product flow.

594 PO NOTE 594
PIND testing required for semiconductor devices with cavities, when it is not performed during standard product flow.

597 PO NOTE 597
Supplier shall provide a final "As-Designed As-Built" summary of build with material delivery.

604 PO NOTE 604
Supplier shall provide an EEE parts list and/or Material Identification and Usage List (based on applicability) at product buy-off per buyer approved format.

606 PO NOTE 606
PIND testing required for hybrid devices with cavities, when it is not performed during standard product flow.

610 PO NOTE 610
All solid tantalum capacitors must be surge current tested.

613 PO NOTE 613

The following materials are prohibited and shall not be used: Zinc, Cadmium, electrodeposited Tin, and all forms of pure tin (purity >97%). Parts containing cadmium alloys, zinc alloys, or selenium alloys (e.g. brass) shall be completely over plated with an approved metal. Any exception to these prohibited materials must be approved in advance by the buyer in writing. The seller shall physically verify material composition of its product prior to shipment and shall provide documentation of the verification to buyer. The seller is exempt from verification of Prohibitive Material when:

- The purchase order is for single parts with no internal elements.
- The seller has no capability to perform the Prohibitive Material Testing (if this is the case, the buyer shall be notified at time of quote)

For these exceptions, material will be verified at incoming inspection by the buyer and will not require verification by supplier.

614 PO NOTE 614

For Purchase Orders of end items in which it is the responsibility of the Seller to procure components, it is the responsibility of the Seller to obtain any product assurance requirements (i.e.: screening/qualification data, product certifications, DPA reports, PMT reports, PIND reports, Source Inspection (pre-cap or final), Receiving Inspection) either dictated by the Source Control Drawing, the Engineering Drawing, Military/Commercial Specification, and/or standard internal procedure. These requirements shall be retained at the Seller's facility for a term dictated by the Purchase Order.

617 PO NOTE 617

IN ADDITION TO THE TERMS & CONDITIONS REFERENCED BELOW, IF THIS ORDER IS PLACED UNDER A U.S. GOVERNMENT CONTRACT OR SUBCONTRACT, THE FOLLOWING CLAUSE OF THE DEPARTMENT OF DEFENSE FAR SUPPLEMENT (DFARS), IF INCLUDED IN THE BUYER'S CONTRACT, SHALL APPLY TO THIS ORDER AS SPECIFIED: 252.225-7003, 252.225-7008 and 252.225-7009.

620 PO NOTE 620

All components supplied to this Purchase Order must be from the same lot date code and have been manufactured within sixteen months of PO placement. If the order cannot be fulfilled with components manufactured within this timeframe, components shall not be shipped without written acceptance.

621 PO NOTE 621

Radiation test data shall be supplied with order to include TID, DDD, SEE/SEU and RLAT

624 PO NOTE 624

Components used in the assembly shall be manufactured within a 5 year lot date code

625 PO NOTE 625

Components to be shipped on tape & reel or in waffle packs packaged in accordance to ESD (ANSI/ESD S20.20) or equivalent.

640 PO NOTE 640

CDR and M123 type ceramic capacitors shall not be procured from the AVX, Myrtle Beach facility, location: PO Box 867, 801 17th Avenue South, Myrtle Beach, SC 29577-0867, US; Cage Code: 04222.

641 PO NOTE 641

All documents provided must be in English and shall be legible. The buyer may refuse to accept items if the Data is illegible and/or difficult to read.

646 PO NOTE 646

For dimensional inspection, sampling per ANSI/ASQ Z1.4, level III, AQL 1.0 (except all sample sizes shall be accept on "0" reject on "1") is acceptable.

661 PO NOTE 661

PWB supplier shall manufacture and supply independent laboratory coupons in accordance with 8252313. These coupons shall be provided to GSFC system assurance manager for evaluation. Supplier will then ship material, original GSFC report, and the required coupons to buyer. In addition, the seller shall deliver quality conformance test coupons in accordance with 8252313.

Ship coupons to the following:

Helen Saulino

Code 541 Bldg: 30, Rm: 181

NASA/GSFC

Greenbelt, MD 20771

Phone: 301-286-8793

Fax: 301-286-1646

Email: helen.e.saulino@nasa.gov

Revision History

DCS Approval: Vera Wallace	
Owner Approval Mick Dodge	Updater Approval Mick Dodge
Revision: H Date: 05/03/2019	

Current Revision Summary

Date	Revision	Description of Change	Owners Initial	Updaters Initial
04/10/15	A	Update specification to remove (Form T-1370) form document and create name.	M.D.	M.D.
04/10/15	A	DCS Release	-	VW
06/01/15	B	Updated Appendix C by adding Q-Code QI-14. (This brings Appendix C in line with revision K of the parent document SSD-2000-02-020-04.) Also, the following PO Notes were added to Appendix C: 523, 526, 538, 573, 578, 586, 597, 640, 641, 646, and 661.	M.D.	G.P.
06/02/15	B	DCS Release	-	VW
07/29/15	C	Add Q-Code C06_LF for RoHS material	M.D.	M.D.
07/30/15	C	DCS Release	-	VW
09/17/15	D	Added - **J10 NADCAP Certified Special Process Requirement**	MD	VW
09/17/15	D	DCS Release	-	VW
11/18/15	E	Add clarification for K32, U10 series, U17 and V02	MD	MD
11/18/15	E	DCS Release	-	VW
01/05/16	F	Added Q-Code U10-IST for IST testing	MD	MD
01/22/16	G	Added V10 & J11	MD	MD
01/22/16	G	DCS Release	-	VW
05/03/19	H	Added J12 and modified K32	MD	MD
05/03/19	H	DCS Release	-	VW
10/16/19	J	Clarification of J12 for Mercury only	MD	MD
10/16/19	J	DCS Release	-	VW

Detailed revision history is maintained within the Sypris Electronics Quality Systems Management Team and may be viewed upon request.