

REVISIONS				
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ALL SHEETS ARE REV AC


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<p>EXPORT CONTROLLED EAR RESTRICTED</p>	<p>QUALITY ASSURANCE PROVISIONS</p>			
<p>SEE INGENUUS FOR ELECTRONIC SIGNATURE RECORD</p>	SIZE A	CAGE CODE 16170	<p>7700033</p>	
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1.0 PURPOSE

This document defines the specific requirements for an effective system to control the quality level for purchased products supplied to Teledyne Microelectronic Technologies, subsequently referred to as TMT. The quality of TMT products and, therefore, the success of business depend in large measure upon the quality and the reliability of the parts, materials, and services furnished by our Suppliers.

2.0 QUALITY POLICY

“Customer satisfaction is our guiding principle. We must be responsive to customer needs and compliant with customer requirements, while producing products of the highest quality through continuous process improvements.”

3.0 SCOPE

This document establishes the Quality Assurance requirements (QP Rider Clauses) which are applicable as specified on the Procurement Document whenever QP Riders are selected for, or transmitted on the Purchase Order. The Q.P. Riders are assigned by Supplier Quality Assurance (SQA), to facilitate the communication of additional Quality Assurance requirements to suppliers of service(s) or material(s) to TMT.

4.0 DEFINITIONS

Authorized Distributor: An individual or business that is authorized by the OEM/OCM to sell OEM/OCM items or services.

Calibration/Measurement: A complete set of measuring devices, standards, software media, procedures, and associated documentation designated for use on product to meet required specifications.

Counterfeit: An item that includes, but is not limited to 1) an item that is an illegal or unauthorized copy or substitute of a genuine OEM/OCM item, 2) an item that does not contain the proper external or internal materials or components required by the OEM/OCM or is not constructed in accordance with the OEM/OCM requirements, 3) an item that is salvaged, reclaimed, refurbished or modified to be passed off as new material, 4) and item that is passed off as passing all screening and compliance testing, and 5) and item that is label, marked, packaged, or reasonable likely into misleading the a party into believing it is a genuine OEM/OCM item when it is not.

Independent Distributor/Broker: A person or business that purchases excess inventories or material from end users with the intention to redistribute it back into the market.

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Nonconformance: A condition of any article, material or service in which one or more characteristics do not conform to requirements specified in the contract, drawings, specifications, or other approved product description. This includes failures, discrepancies, defects, anomalies, and malfunctions.

OEM (Original Equipment Manufacturers)/OCM (Original Component Manufacturer): The manufacturer and origin of material that is furnished for use in finished product.

Processes: Manufacturing and software development processes used in producing the material described by the contract, other than special and proprietary processes. The scope of software development processes evaluation will be specified in the contract.

Procurement Document: The Purchase Order or Subcontract that is a legal and binding contract for purchased material that specifies terms and conditions with defined requirements. It will be subsequently referred to as P.O hereafter.

Product: All TMT-purchased raw material, bulk material, parts, subassemblies, units, software, firmware, and service.

Rework: Used when an article can be made to conform to drawing requirements. Detailed instructions must be included or referenced.

Repair: Used when the nonconforming article, material or service can be corrected to a usable condition, although its condition will not be identical with drawing / specification requirements. The Vendor shall ensure that product which does not conform to product requirements is identified and controlled to prevent its unintended use or delivery. The controls and related responsibilities for dealing with nonconforming product shall be defined in a documented procedure. The Vendor's documented procedure shall define the responsibility for review and authority for the disposition of nonconforming product and the process for approving personnel making these decisions.

Software Product: A complete set of computer programs, software media, procedures, and associated documentation and data designated for delivery to a user.

Software Service: Performance of activities, work, or duties connected with a software product, such as its development, maintenance, and operation.

Special Processes: The processes of a chemical, metallurgical, bonding, printed circuit boards (PCB/PWB), biological, sonic, electronic, or radiographic nature that require, to an extent deemed significant, specialized equipment, procedures, personnel training, materials, and/or equipment and certification or calibration controls. Refer to "Special Process Supplier Quality Requirements" as invoked by specific P.O. quality clause provisions in the contract.

The Government: Shall mean U.S. Government.

The Supplier: Any source of product or service procured by TMT which is also the referenced as the Vendor.

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Vendor: Refer to the definition of Supplier.

Waiver: A form used by the Supplier to request authorization from TMT to ship noncompliant product to TMT when TMT material review consideration is required. A waiver is used when the product cannot be made fully compliant through the standard rework process.

5.0 QUALITY PROVISIONS

The Quality Program Provisions are incorporated herein as Attachment A, QP Riders. The following QP Riders are a requirement of the procurement when specified by the three digit number designation (###), as applicable on the Procurement Document. The General Quality Assurance requirements on Appendix A, paragraph 1 through 5 herein apply to all procurements. Suppliers are required to adhere to the Quality Provision, unless otherwise directed by contract or written approval.

6.0 PROHIBITED METALS

Depending on the product(s), service(s) or material(s) purchased the vendor shall insure they are free of Mercury (**Hg**), Cadmium (**Cd**), or Zinc (**Zn**). Some Suppliers will be required to complete and return a Material Free Certification and shall be completed as provided for by Quality Provision number 279 herein.

7.0 PURE TIN (Sn) FINISH PROHIBITION CERTIFICATION

Depending on the product(s), services(s) or material(s) purchased, Suppliers will be required to complete and return a Pure Tin Finish Prohibition Certification in accordance with MIL-PRF-38534 Appendix E, par. E.4.2.7.1 and shall be completed as provided for by Quality Provision number 280 herein.

8.0 VENDOR APPENDIX "A"

Current revisions of this document shall be provided as an electronic copy or via the TMT website to all suppliers that TMT requests a quote from.

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APPENDIX A: QUALITY PROGRAM PROVISIONS

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SUPPLIERS TAKE NOTE

QUALITY PROGRAM PROVISIONS (PURCHASE ORDER)

THE INDICATED QUALITY PROGRAM PROVISIONS WILL BECOME AN INTEGRAL PART OF THE PURCHASE ORDER. THE APPLICABLE QUALITY PROGRAM PROVISIONS ARE LISTED BY NUMBER ON THE FIRST PAGE OF THE PURCHASE ORDER OR PURCHASE CHANGE ORDER IN THE AREA LABELED "Q.P. RIDER PROVISIONS". THE TEXT FOR THE NUMBERS APPEARING IN THIS BLOCK IS DEFINED IN NUMERICAL SEQUENCE ON THE FOLLOWING PAGES.

APPLICABLE TO ALL PROCUREMENT

1. Where a specification is referred to herein, it shall be construed as being of date of issue as of the date of this Purchase Order or a firm quotation, whichever is earlier.
2. All data, certificates, and correspondences shall be provided in English.
3. **Nonconforming Material**

Teledyne grants no MRB/MRA authority to the Vendor or its sub-tier suppliers. The Vendor is not authorized to perform Material Review Action or Material Review Board outside the contractual agreements of nonconforming materials, with the intent of delivering such nonconforming materials, without the express written authorization from Teledyne Microelectronic Technologies, Lewisburg, TN Facility. Disposition of any departures from drawings specifications, or other purchase order requirements must be approved by Teledyne prior to shipment. An electronic mail message from the Product Assurance Department Quality Engineer or Purchasing Buyer is sufficient and binding.

NOTE: Preliminary review does not negate the requirement to identify, segregate, document, and report any disposition of non-conformance.

Non-conformance's shall be reported to Teledyne under the following conditions. When notification is required, notification shall be within three (3) working days after the nonconformance is discovered and the vendor shall have in place a containment plan to prevent additional non-conforming material from being shipped.

The problem is detected during one of the following:

- a. Certification, acceptance, or qualification testing.
- b. Other "significant" test as specified by TMT.
- c. Turnaround, maintenance, overhaul, or rework, to material, test operation or shipping and receipt of hardware/material delivered to TMT including any test involving hardware/material previously accepted by TMT and returned for rework, modification, or etc.

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- 4 When the requirements of this document conflicts with the requirements of other controlled documents referenced in the contract, the order of precedence will be as follows:
 - a. Purchase Order / Contract
 - b. Detail specification, statement of work, or drawing
 - c. Military or other agency quality specifications
 - d. This document (7700033)
 - e. Teledyne Microelectronic Technologies approved Action Directives

- 5 Supplier Deviation Request: Exceptions to the requirements as specified in this document must have written approval by TMT prior to the commencement of fabrication. Each Supplier will be requested to provide written acknowledgement and acceptance of the approved waiver(s) via use of TMT's Form TMT1359, 'Supplier Deviation Request.'

- 6 The supplier shall have in place a **Counterfeit Risk Mitigation Plan** that conforms to Teledyne Procedure 7701109, 'PROTECTION FROM COUNTERFEIT PARTS.' The Supplier shall flow down these criteria to its suppliers to avoid use of material purchased from unauthorized sources. Seller and the seller's sub-tiers shall only purchase parts from OEM/OCM or their Authorized distribution chain and take measures to ensure parts are genuine and legitimate.

- 7 **QUALITY MANAGEMENT SYSTEM** The Vendor shall have a quality program that complies with International Organization for Standardization ISO 9000 or SAE, AS9100- Model for Quality Assurance System.

If Teledyne has accepted a Vendor's AS9100/ ISO 9000 registration and the Vendor subsequently changes registrars, loses its registration status, or is put on notice of losing its registration status, it shall notify Teledyne's Quality Assurance Department within three (3) days of receiving such notice from its registrar."

The Vendors' Quality Management shall assure that material and services conform to purchase order requirements. The quality system shall be documented, provide for early detection of non-conformance, and records shall be made available for periodic review when deemed necessary. An alternative quality system may be submitted to Teledyne for approval. Teledyne reserves the right to conduct surveillance or an audit at the Vendor's facility to determine whether the Vendor's quality system meets requirements of this clause.

A copy of ISO 9000 series can be obtained from the International Organization for Standardization at the following URL address: <http://www.iso.org/> and AS9100 can be obtained from SAE International at the following URL address: <http://www.sae.org/>.

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- 8 COUNTERFIET PREVENTION PLAN** -The Seller shall ensure that only genuine material is used in, or is procured for product delivered to TMT. The Seller shall maintain a risk mitigation process internally and with its suppliers in compliance with requirements set forth herein and shall provide evidence upon request. The Seller may only purchase material directly from OEM/OCM or Authorized/Franchised Distributors. Independent Distributors and Brokers are strictly **PROHIBITED** unless authorization is obtained in advanced from TMT. Such authorization must be submitted by the seller and shall provide complete and compelling evidence to support the material is genuine.
- 9 RECORD RETENTION** - The Vendor and sub-tier suppliers shall maintain verifiable objective evidence of all inspections and test performed, results obtained and dispositions of non-conforming articles. These records shall be identified to associated articles, including heat and lot number of materials, unit or lot serialization and made available to Teledyne and/or Government Representatives upon request and shall be retained in a safe, accessible location for a period of years as defined by contract after date of delivery. All related documentation shall at a minimum be retained for seven (7) years for class “K/B” and five (5) years for class “H/S and all other products. All retained data must be retrievable within seventy-two (72) hours When requested by Teledyne.

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QUALITY PROVISIONS (Q.P Riders)

105 ELECTROSTATIC DISCHARGE CONTROL

The Vendor shall provide and maintain an Electro-Static Discharge (ESD) Protection Program and Packaging. The Vendor shall document and implement an ESD control program where parts must be properly handled, packaged and identified. As a minimum, MIL-STD-1686 or ANSI/ESD-S20.20 shall be complied with. Packaging techniques Type I, or Type II barrier material or equivalent shall be used in device shipment. All goods will be placed in shielded or static-dissipative packages, tubes, carriers, conductive bags, etc., for shipment. The packaging must be clearly labeled to indicate that it contains electrostatic sensitive goods.

121. CERTIFIED SUPPLIER PROCUREMENT

TMT's reduced incoming inspection programs. All items covered under this Purchase Order are to be processed by the supplier in accordance with the Supplier Certification Agreement on file. Certified suppliers are notified in writing that they are eligible for the Certification program and agreement shall be in place before "Certified" status is granted.

123. GOVERNMENT SURVEILLANCE-NASA AND MILITARY CONTRACTS

The Government has the right to enter and review any or all of the work included in this order at the supplier's plant. Government inspection or release of product prior to shipment is not required, unless you are otherwise notified. The Vendor shall furnish, at no cost, all reasonable facilities, equipment, all applicable data and drawings, inspection instructions, and assistance for the safety and convenience of the Government Representatives in the performance of their duties.

130. TELEDYNE SOURCE INSPECTION

Teledyne source inspection is required prior to shipment of articles from the Vendor's facility. Upon receipt of this P.O and prior to commencing work, the Vendor shall notify Teledyne at a minimum of five (5) working days in advance of the time the articles or materials are ready for inspection or test.

The Vendor shall furnish, at no cost to Teledyne, the necessary facilities, equipment, all applicable drawings, specifications, procedures, and statements of work, test software, and changes thereto; related inspection and/or test equipment, and such other information as may be required to satisfactorily perform the inspections and tests required under this Order.

Acceptance of the parts by Teledyne constitutes full acceptance and no further inspection is conducted at Teledyne. The Vendor shall obtain stamp or signature of the Teledyne Quality Assurance representative or designee on the shipping document prior to shipment of material. Failure to do this may result in rejection of material upon receipt at Teledyne.

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132. FIRST ARTICLE

The Vendor shall conduct a First Article for the product being purchased, and representative in every way of the product to follow. If the deliverable is an assembly, this inspection shall also include all of the piece parts that make up the assembly. The inspection records and data shall be per AS9102 and shall identify each characteristic and feature(s) required by design data, the allowable tolerance limits, and the actual dimension measured as objective evidence that each characteristic and feature has been inspected and accepted by the Vendor's quality and inspection function. First Article shall be effective for 24 months upon acceptance by a Teledyne Quality Assurance representative.

Prototype(s) shall not be submitted as a First Article. When testing is required, the parameters and results of the test shall be recorded in the same manner. The First Article Inspection Report must show evidence of acceptance by The Vendor's Quality Assurance Representative.

First Article Report shall be in accordance with AS9102 and contain, as a minimum, the following:

- (1) The Teledyne Purchase Order number.
- (2) The specification or drawing number, including the revision level to which the product was built.
- (3) The process traveler, tooling, etc. used in production with applicable revisions of record.
- (4) Measurements/data from all of the drawing dimensions and criteria shall be noted and identified. If the criteria is deemed not applicable an entry if N/A will be recorded.
- (5) Test data for electrical or mechanical tests and criteria shall be noted and identified. If the criteria is deemed not applicable an entry if N/A will be recorded.

One or more of the sub provisions maybe applicable:

133 DELIVERY OF FIRST ARTICLE INSPECTION RECORDS: The Vendor shall provide one (1) reproducible copy of the First Article records and First Article Records Report accompanied by variables data with the initial shipment.

134 RETENTION OF FIRST ARTICLE: The Vendor shall retain the first article(s) as objective evidence and make available to TMT upon request. Disposal of first article is prohibited until authorized by TMT in writing.

135 DELIVERY OF FIRST ARTICLE: The Vendor is required to deliver the first article to TMT for verification, as part of the Contract / Purchase Order, prior to the shipment of any balance of said Contract / Purchase Order, unless otherwise specified.

136 SOURCE INSPECTION OF FIRST ARTICLE: TMTs' source inspection to

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witness the first article inspection, or specific details as specified in this Contract / Purchase Order.

145. TRACEABILITY

The supplier (and their subcontractor) is required to control raw materials and parts at all times, to maintain traceability to the material certifications, test data, inspections and any processing performed. The supplier shall generate records that document clear, unquestionable traceability from S/N's to test data and inspections performed. Objective evidence of traceability control shall be on file, and may be subject to Teledyne review and / or audit.

146 Raw material - shall be identified by lot number.

147 Multiple Lot Traceability - All material fabricated by the Vendor in one lot shall be identifiable to that lot. When the Vendor combines materials fabricated in two or more different lots to fulfill Purchase Order requirements, these materials shall be segregated and identifiable to the lots from which they were fabricated.

148 Class K - All material fabricated shall be homogenous subassemblies or chemical batches, and of the same manufacture lot.

149 Semiconductor dice - shall be identified by wafer lot number. A "wafer lot" is defined as a homogenous lot of device(s) which have been processed through all phases of wafer manufacturing together.

152 LIMITED CALENDAR (SHELF) LIFE MATERIAL

The Vendor shall identify all age sensitive parts and/or materials, for example, items, package(s) or container(s) having characteristics susceptible to quality degradation with age, or is limited calendar shelf-life, with the manufacture date, manufacturer's recommended shelf life (or Teledyne specified shelf life).

Age sensitive items must be marked in such a manner as to indicate the date at which the critical life was initiated and when the useful life will be expended (i.e. shelf life expiration). The Vendor shall identify each item and each outer container with its storage temperature, special handling conditions, and hazard warnings. Materials must have more than 75% or greater than 6 months of shelf life available at the time of receipt by Teledyne.

154. THE VENDOR'S CONTROLLED PRODUCTS

The initial shipment on this Purchase Order shall be accompanied by one (1) legible and reproducible copy of applicable specifications, drawings, die geometry, and/or catalogs.

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155. CHANGE OF PRODUCT OR PROCESS

The Vendor shall be responsible for controlling and tracking changes to parts and components manufactured during the time the contract is executed. The Vendor shall provide in writing advance notification to the Teledyne of any change(s) to tooling, facilities, materials or processes at the Vendor or the Vendors sub-tier during the execution of the contract that could affect the form fit or function of the product or service. The intent of this requirement is to ensure that all material supplied under this order will be homogenous, and the performance, reliability, and quality of the material is not degraded. Changed articles shall be clearly identified and in a different manner from previous articles via labeling or part number.

156. TMT FURNISHED/PROCURED MATERIAL

The Customer supplying material on this Purchase Order shall maintain all traceability and inspection records at their facility for the items shipped. Teledyne assumes that all material is 100% acceptable as received and does not conduct inspection of material at Receiving. If material is deemed unacceptable during manufacturing processing, that material shall be purged and returned to the Customer for replacement.

157. WIRE IDENTIFICATION

The Vendor shall provide certification that each shipment of electrical wire or cable furnished under this contract conforms to the applicable specifications. For each lot or cable in each shipment, a certified test report or copy thereof shall be included with the packing sheet. The test report shall, at a minimum, include a record of the physical, chemical, or electrical (and in the case of RF cable, electronic) inspections and tests conducted to satisfy the acceptance requirements of applicable specifications, and shall include numerical results when applicable. For cable shipments, these requirements apply to both basic and finished cable. When the specification requires other inspection or test data to be reported, it shall be included in the test report.

Each package or spool of wire on this order must be legible and permanently identified with:

- (1) Teledyne Specification Number
- (2) Gauge
- (3) Manufacturer
- (4) Manufacturer Lot/Melt Number
- (5) Manufacturer Date
- (6) Expiration Date
- (7) Length
- (8) Elongation
- (9) BL or Tensile Strength
- (10) Insulation Cure Date (as applicable)
- (11) Military Specification Number (if applicable).

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158. SUPPLIER OTHER THAN THE MANUFACTURER, DISTRIBUTOR

The Vendor or Seller other than the manufacturer, shall be otherwise is known as a Distributor. The Distributor shall provide along with their C of C all copies of C of C's that show clear and traceable path of procurement back to the OEM/OCM. All C of C's supplied shall identify the manufacturer and location of manufacture of each item furnished under the procurement. The Distributor shall provide along with their lot identification and C of C, the Original Component Manufacturer's/Original Equipment Manufacturer (OCM/OEM) part number, lot identification and (OCM/OEM) C of C, as well as any sub tier sources they procured material from. Component(s) or part(s) may be purchased through distribution with the understanding that the supplier is an authorized or franchised agent for the manufacturer, and that all contractual requirements have been met. It is the Distribution Agent's responsibility to assure the current status of the manufacturer with regard to inclusion on the current approved vendor list (as required).

220. TEST REPORTS

Each shipment shall be accompanied by one (1) legible and reproducible copy of reports of objective evidence that tests are performed in accordance with specification or Purchase Order requirement. Reports shall be identifiable to material submitted. The Supplier shall identify any lots that have previously passed Element Evaluation, i.e. Pre-qualified lots with a trace number, on the Certificate of Compliance. Test reports need only be delivered with the first lot shipped to Teledyne. These reports must contain the signature of and title of an authorized representative of the agency performing the tests and must assure conformance to specification requirements.

221. CERTIFICATE OF CALIBRATION

The Vendor shall have a documented calibration system that has been approved as part of their established quality system. The Vendor's calibration system must be complaint with "American National Standard Institute (ANSI)/National Conference of Standards Laboratories (NCSL) Z540-X General Requirements for Calibration Laboratories and Measuring and Test Equipment" Instrument, gage, tool, or equipment calibration reports must be provided. Report must include:

- Identification of the item calibrated.
- Identification of the calibration standard and procedure employed.
- Degree of non-conformance (percent out of tolerance) of the item when submitted for calibration.
- Results of inspection for damage or condition hazardous to the accuracy integrity of the item.

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- Results of calibration.
- Name of the calibrating agency.
- Identity of individuals performing calibration.
- Certifying statement that the standard used for calibration bears evidence of current traceability to the National Institute of Standards and Traceability.
- Date of calibration.
- Signature of a responsible representative of the calibrating agency.

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230. Element Evaluation Class “H” Component Attach (epoxy)

The vendor shall perform element evaluation in accordance with MIL-PRF-38534 (Class “H” requirements only).

When performing Element Evaluation attachment method of the component shall be conductive epoxy.

Note: All passive components shall be mounted with conductive epoxy.

Table I. Element evaluation summary (Ref MIL-PRF-38534)		
Element	Paragraph	Table or MIL-STD-883 Method
Microcircuit and semiconductor dice	C.3.3	Table C-II
Passive elements	C.3.4	Table C-III
Surface acoustic wave (SAW) elements	C.3.5	Table C-IV
Substrate evaluation	C.3.7	Table C-V
Package evaluation	C.3.8	Table C-VI
Integral substrate/package evaluation	C.3.9	Table C-VII
Polymeric material evaluation	C.3.10	Method 5011

The vendor shall submit one (1) legible and reproducible copy of the element evaluation results which shall include (as applicable):

- ✓ Element Evaluation traveler or similar document indicating that all required steps have been completed and accepted,
- ✓ Actual read and record electrical test results,
- ✓ Actual bond pull results,
- ✓ Actual die shear results, and
- ✓ C of C with statement indication 100% electrical test and visual inspection has been performed.

NOTE: 100% electrical test may be performed at the wafer level.

For active devices - Sample will consist of at least ten die from each wafer lot.

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231. Element Evaluation Class “K” Component Attach (epoxy)

The vendor shall perform element evaluation in accordance with MIL-PRF-38534 (Class “K” requirements only).

When performing Element Evaluation attachment method of the component shall be conductive epoxy.

Note: All passive components shall be mounted with conductive epoxy.

Table I. Element evaluation summary (Ref MIL-PRF-38534)		
Element	Paragraph	Table or MIL-STD-883 method
Microcircuit and semiconductor dice	C.3.3	Table C-II
Passive elements	C.3.4	Table C-III
Surface acoustic wave (SAW) elements	C.3.5	Table C-IV
Substrate evaluation	C.3.7	Table C-V
Package evaluation	C.3.8	Table C-VI
Integral substrate/package evaluation	C.3.9	Table C-VII
Polymeric material evaluation	C.3.10	Method 5011

The vendor shall submit one (1) legible and reproducible copy of the element evaluation results which shall include (as applicable):

- ✓ Element Evaluation traveler or similar document indicating that all required steps have been completed and accepted,
- ✓ Actual read and record electrical test results (over temp),
 - Interim electrical,
 - Post burn-in,
 - Final electrical
- ✓ Evidence of burn-in (240 Hours)
- ✓ Evidence of steady state life test (1000),
- ✓ Actual bond pull results,
- ✓ Actual die shear results,
- ✓ Actual SEM analysis results, and
- ✓ C of C with statement indication 100% electrical test and visual inspection has been performed.

NOTE: 100% electrical test may be performed at the wafer level.

For active devices - Sample will consist of three die from each wafer and a total of at least ten die from each wafer lot. If one wafer is evaluated, then ten die shall be tested. If ten wafers are evaluated, then 30 die (three from each wafer) shall be tested.

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232. Element Evaluation Class “H” Component Attach (EUTECTIC)

The vendor shall perform element evaluation in accordance with MIL-PRF-38534 (Class “H” requirements only). When performing Element Evaluation attachment method of the component shall be eutectic attach.

Table I. Element evaluation summary (Ref MIL-PRF-38534)		
Element	Paragraph	Table or MIL-STD-883 Method
Microcircuit and semiconductor dice	C.3.3	Table C-II
Passive elements	C.3.4	Table C-III
Surface acoustic wave (SAW) elements	C.3.5	Table C-IV
Substrate evaluation	C.3.7	Table C-V
Package evaluation	C.3.8	Table C-VI
Integral substrate/package evaluation	C.3.9	Table C-VII
Polymeric material evaluation	C.3.10	Method 5011

The vendor shall submit one (1) legible and reproducible copy of the element evaluation results which shall include (as applicable):

- ✓ Element Evaluation traveler or similar document indicating that all required steps have been completed and accepted,
- ✓ Actual read and record electrical test results,
- ✓ Actual bond pull results,
- ✓ Actual die shear results, and
- ✓ C of C with statement indication 100% electrical test and visual inspection has been performed.

NOTE: 100% electrical test may be performed at the wafer level.

For active devices - Sample will consist of at least ten die from each wafer lot.

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233. Element Evaluation Class “K” Component Attach (EUTECTIC)

The vendor shall perform element evaluation in accordance with MIL-PRF-38534 (Class “H” requirements only). When performing Element Evaluation attachment method of the component shall be eutectic attach.

Note: All passive components shall be mounted with conductive epoxy.

Table I. Element evaluation summary (Ref MIL-PRF-38534)		
Element	Paragraph	Table or MIL-STD-883 method
Microcircuit and semiconductor dice	C.3.3	Table C-II
Passive elements	C.3.4	Table C-III
Surface acoustic wave (SAW) elements	C.3.5	Table C-IV
Substrate evaluation	C.3.7	Table C-V
Package evaluation	C.3.8	Table C-VI
Integral substrate/package evaluation	C.3.9	Table C-VII
Polymeric material evaluation	C.3.10	Method 5011

The vendor shall submit one (1) legible and reproducible copy of the element evaluation results which shall include (as applicable):

- ✓ Element Evaluation traveler or similar document indicating that all required steps have been completed and accepted,
- ✓ Actual read and record electrical test results (over temp),
 - Interim electrical,
 - Post burn-in,
 - Final electrical
- ✓ Evidence of burn-in (240 Hours)
- ✓ Evidence of steady state life test (1000),
- ✓ Actual bond pull results,
- ✓ Actual die shear results,
- ✓ Actual SEM analysis results, and
- ✓ C of C with statement indication 100% electrical test and visual inspection has been performed.

NOTE: 100% electrical test may be performed at the wafer level.

For active devices - Sample will consist of three die from each wafer and a total of at least ten die from each wafer lot. If one wafer is evaluated, then ten die shall be tested. If ten wafers are evaluated, then 30 die (three from each wafer) shall be tested.

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270. STATEMENT OF CONFORMITY-SHIPPING DOCUMENTS (C OF C)

The Vendor shall submit one (1) legible and reproducible copy of a Certification of Compliance and/or Certificate of Conformance (C of C) with each shipment. The C of C is defined by Military Specifications (Military Standards, Federal Specifications, and NASA Documents, etc.), or Standard Military Drawings (SMD's) listing the Purchase Order and line items to which the material complies. The C of C shall be traceable to TMT part coding and P.O number and shall identify the date of shipment. The C of C shall contain the signature and title of an authorized representative of the Vendor. Certifications not accompanying shipment will require a waiver from Teledyne Microelectronic Technologies, Lewisburg, TN Facility prior to shipment. The applicable material test results, process certifications and inspection records shall be presented upon Teledyne's request. The Vendor shall perform inspection, as necessary, to determine the acceptability of all articles under this Order. All articles submitted by The Vendor under this P.O are subject to final inspection at Teledyne Facility. The C of C shall be subject to audit by TMT QA personnel and discrepancies found will be an input to the Supplier Rating System. A statement of compliance to the specification is to be included on the Vendor's shipping document. The Shipper and C of C may be the same document. The shipping document(s) shall contain the following:

- The Vendor's name
- Teledyne part number,
- Specification number,
- Device type,
- Size,
- Quantity,
- Original Manufacturer
- Manufacturer's lot number,
- Manufacturer's recommended shelf life
- Special handling conditions and hazard warnings.

271. CERTIFICATE OF ANALYSIS (C OF A)

The Vendor shall submit one (1) legible and reproducible copy of a Certificate of Analysis (C of A), for raw material. The Certificates of Analysis describes physical/chemical analysis test reports for a particular lot/batch of product that has been tested, inspected, and found to be in compliance with the applicable material specifications and shall be traceable to the raw material used in the fabrication of the items supplied. The C of A must list any Certified Reference Material (CRM), specifications, including revision numbers or letters, to which the material has been tested and/or inspected, the identification of the material lot to which it applies, purity and lot number of the starting material, or 'Raws'. In addition, Castings and Forgings shall be provided with lot number, serialization and related evidence of foundry control, including fabricated physical properties, as applicable

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The certification shall contain the signature and title of an authorized representative of the Vendor. Certifications not accompanying shipment will require a waiver from Teledyne Microelectronic Technologies, Lewisburg, TN Facility prior to shipment.

The Shipper and C of A may be the same document as the shipping document(s) and shall contain the following components:

- Name and Address of Certifying Body
- Title of Document
- Description of Material
- Reference Material Code and Batch Number
- Description of CRM
- Intended Use
- Instructions for the CRM's Correct Use
- Hazardous Situation
- Level of Homogeneity
- Certified Values and their Uncertainties
- Traceability
- Values Obtained by Individual Laboratories or Methods
- Uncertified Values
- Date of Certification
- Period of Validity
- Further Information
- Names and Signatures of Certifying Officers

277. MULTILAYER /TWO-SIDED PRINTED CIRCUIT BOARDS, HIGH RELIABILITY

The Vendor shall provide certification of compliance to all applicable specification requirements and shall supply test coupons or tabs (fabricated simultaneously with the boards) with each lot of multilayer boards supplied. For two-sided printed circuit boards, the Vendor shall provide certification of compliance to all applicable specification requirements and shall supply test tabs, coupons and one extra circuit board (fabricated simultaneously with the lot) with each lot supplied for the purpose of performing acceptance tests at Teledyne Microelectronic Technologies, Lewisburg, TN Facility. Final acceptance of the lot will be contingent upon test results.

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279. METAL PROHIBITION

All items covered by this Purchase Order shall be certified as being free of metallic Mercury (Hg), Cadmium (Cd), Zinc (Zn) or the metallic compounds. Further, the Vendor shall certify that the items have none of the following: Mercury (Hg), Cadmium or Zinc (Zn) contamination during fabrication and testing prior to delivery. This certification may be incorporated into the supplier's standard C of C and shall contain the following phrase, hereby certifies that the design of material furnished under Purchase Order Number _____, contain none of the following: metallic Mercury (Hg), Cadmium (Cd), Zinc (Zn) or the metallic compounds. Further the Vendor certifies that the material furnished have not been exposed to or exhibit Mercury (Hg), Cadmium (Cd), Zinc (Zn) contamination during the fabrication and testing prior to delivery of finished goods', or forward a completed copy of the provided certificate with in this document. Reference Purchase Order Attachment, [Figure 1](#). Trace elements, with impurity levels and limits as defined in J-STD-006B are allowed for solder alloy compositions. This includes components with solder alloy end terminations.

280. PURE TIN (Sn) FINISH PROHIBITION CERTIFICATION

All items covered by this Purchase Order shall be certified as being free of pure tin finishes on both external and internal structures. As referred to in MIL-PRF-38534 Appendix E, par. E.4.2.7.1, Tin (Sn) is considered to be pure if it contains less than 3% alloy material, i.e. Lead (Pb). Further, the Vendor shall certify that the items are in compliance with this requirement. This certification may be incorporated into the supplier's standard C of C and shall contain the following phrase, "hereby certifies that the design of the material furnished under Purchase Order Number _____, contains no pure Tin (Sn) finishes on both external and internal structures as referred to in MIL-PRF-38534 Appendix E, par. E.4.2.7.1". Further, the Vendor certifies that the supplies furnished are in compliance with this requirement prior to delivery of finished goods, or forward a completed copy of the provided certificate with in this document.

Reference Purchase Order Attachment, [Figure 2](#).

281. COMPLIANCE TO DFARS SPECIALTY METALS CLAUSE

Pursuant to DFARS 252.225-7014, specialty metals incorporated in articles delivered to TMT must be (1) melted in the United States; (2) in a "qualifying country" as define in DFARS 225.872-1; (3) incorporated into any article in a "qualifying country." The Vendor is to provide certificate of compliance to DFARS 252.225-7014 Preference for Domestic Specialty Metals, Alternate I (Apr 2003). This certification may be incorporated into the supplier's standard C of C.

DFARS can be found at <http://www.acq.osd.mil/dpap/dars/index.htm> or <http://farsite.hill.af.mil/VFDARa.htm>

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285. MOISTURE SENSITIVE DEVICES

Any multi-leaded component that has a Moisture Sensitivity Level (MSL) greater than 1 must be packed in a sealed Moisture Barrier Bag (MBB) with a desiccant and moisture level indicator. The MBB must have a Moisture Sensitivity label, see below, that indicated the MSL of the components inside, MSL range from 2 to 6.

	CAUTION	LEVEL
	This bag contains MOISTURE-SENSITIVE DEVICES	
If Blank, see adjacent bar code label		
1. Calculated shelf life in sealed bag: 12 months at < 40 °C and < 90% relative humidity (RH)		
2. Peak package body temperature: _____ °C		
If Blank, see adjacent bar code label		
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must		
a) Mounted within _____ hours of factory		
If Blank, see adjacent bar code label		
conditions ≤ 30 °C/60%		
b) stored at < 10% RH		
4. Devices require bake, before mounting, if:		
a) Humidity Indicator Card is > 10% when read at 23 ± 5 °C		
b) 3a or 3b not met.		
5. If baking is required, devices may be baked for 48 hours at 125 ± 5 °C		
Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure		
Bag Seal Date: _____		
If Blank, see adjacent bar code label		
Note: Level and body temperature defined by IPC/JEDEC J-STD-020		

291. MILITARY PACKAGING

Packaging and Preservation shall be in accordance with MIL-STD-2073.

292. LABELING ON PACKAGES AND PARTS

Outer Package label shall include the following information:

Purchase Order Number

Supplier Name and address

Bar Code Label containing the above information (Applicable if the supplier has bar code capability).

293. BEST COMMERCIAL PACKAGING

The Vendor's shall be responsible for ensuring that items provided under this Contract/Purchase Order are packaged in such a manner that boxes or containers, as applicable, should be selected to the extent necessary to provide protection from physical and environmental damage during shipping and handling. Cushioning materials shall be applied, as required, to protect and to restrict movement of the item(s) or that the dimensional integrity is preserved. Packaging shall protect from contamination and that corrosion is prevented. The packaging shall be in accordance with the drawing, appropriate ASTM, MIL, or other applicable TMT specified requirements in accordance with good commercial practice to the extent necessary.

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294. AUTOMATED ASSEMBLY PACKAGING

Only one of the following sub provisions is applicable,

- a) Components to be supplied on tape and reel. The tape size (width) is to be determined by supplier.
- b) Components are to be supplied in tubes.
- c) Components are to be supplied in matrix trays (waffle packs). The Vendor shall comply with Teledyne document 7261475. No more than 20% of a waffle pack shall be vacant except for those packs containing the remaining devices of the shipment, or the devices set aside for element evaluation. Each waffle pack shall include an anti-static protective sheet and a release sheet as needed to insure that die shall not escape from their cavities during shipment and insure that die shall not adhere to the lid when opened. The waffle packs shall not be stacked in a manner that uses the bottom of one waffle pack as the lid or cover of the pack below it. The cavity size dimensions of the waffle pack selected for device shipment shall not allow the device to become wedged, turn or rotate within the cavity during transit to Teledyne Microelectronic Technologies.
- d) Components to be supplied on a Membrane or Gel Pack.

297 DOCK TO STOCK SHIPMENT

Certified Manufacturer's material will only be verified for correct P.O and quantity at Teledyne, and will be routed directly to Stock. All provisions have been processed by the supplier in accordance with the Supplier Certification agreement on file.

300 METAL PACKAGES

The Vendor is required to comply with the appropriate reliability class from MIL-PRF-38534 Appendix C, PACKAGE EVALUATION REQUIREMENTS, and TABLE C-VI.

301 BLANKET PURCHASE ORDERS

This clause allows the use of one (1) P.O when multiple purchases, payments or reimbursements are anticipated. List the "Deliver to" name as described on the Release Form, on the Packing Slip.

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PURCHASE ORDER ATTACHMENT

_____, _____, _____
Vendor Name **City** **State**

Hereby certifies that the design of material furnished under Purchase Order Number _____, contain none of the following: metallic Mercury (Hg), Cadmium (Cd) or Zinc (Zn) or the metallic compounds. Further The Vendor certifies that the material furnished has not been exposed to or exhibits Mercury (Hg), Cadmium (Cd), or Zinc (Zn) contamination during the fabrication and testing prior to delivery of finished goods.

_____, _____, _____
Authorized Signature **Title** **Date**

FIGURE 1 PURCHASE ORDER ATTACHMENT (Mercury, Cadmium or Zinc Free Certificate)

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PURCHASE ORDER ATTACHMENT

_____, _____, _____
Vendor Name City State

Hereby certifies that the design of the material furnished under Purchase Order Number _____, contains no pure Tin(Sn) finishes on both external or internal structures as referred to in MIL-PRF-38534 Appendix E, par. E.4.2.7.1. Further, The Vendor certifies that the supplies furnished are in compliance with this requirement prior to delivery of finished goods

_____, _____, _____
Authorized Signature Title Date

FIGURE 2 PURCHASE ORDER ATTACHMENTS
 (Pure Tin Finish Prohibition Certificate)

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Teledyne Proprietary Information
EXPORT CONTROLLED – EAR RESTRICTED

**TELEDYNE MICROELECTRONIC TECHNOLOGIES
 SUPPLIER DEVIATION REQUEST FORM**

TYPE OF REQUEST: <input type="checkbox"/> Parts already supplied <input type="checkbox"/> Parts to be supplied		DURATION: <input type="checkbox"/> PERMANENT <input type="checkbox"/> REQUESTED EXPIRATION: Until	
REQUESTOR: _____	LOCATION: _____	DATE SUBMITTED: _____	
SUBJECT PART: _____			
SUBJECT SPECIFICATION: _____			
PRESENT REQUIREMENT/SITUATION (Product/Process/Packaging/Batch /Quantity of Parts): _____ _____ _____			
REQUESTED CHANGE: _____ _____			
REASON FOR CHANGE AND ANTICIPATED RESULTS: _____ _____			
SUPPORTIVE DATA (ATTACH INSPECTION RESULTS, CORRESPONDENCE, ETC.): _____ _____			
STATE OF EXISTING INVENTORY, TOOLING OR PROCESS MACHINERY: _____ _____			
OTHER INFORMATION: _____ _____			
SUPPLIER APPROVALS: QUALITY MANAGER: _____ PLANT MANAGER: _____		DATE: _____ DATE: _____	
AFTER RECEIVING ORGANIZATION APPROVALS, SEND TO APPROPRIATE TELEDYNE PURCHASING REPRESENTATIVE			
REPLY: <input type="checkbox"/> THE SUBJECT REQUEST IS APPROVED AS WRITTEN. PENDING THE ISSUANCE OF A FORMAL SPECIFICATION REVISION, THE SUBJECT SPECIFICATION SHOULD BE REGARDED AS HAVING BEEN OFFICIALLY REVISED. <input type="checkbox"/> THE SUBJECT REQUEST IS APPROVED WITH THE CLARIFICATION LISTED BELOW. <input type="checkbox"/> THE SUBJECT REQUEST IS NOT APPROVED FOR THE REASONS LISTED BELOW.		CHANGE REQUEST # _____	
COMMENTS: _____ _____			
TMT DEVIATION REQUEST APPROVALS/REJECTIONS: PURCHASING: _____ QUALITY: _____ ENGINEERING: _____ OPERATIONS: _____		DATE: _____ DATE: _____ DATE: _____ DATE: _____	

TMT1359--

FIGURE 3. TELEDYNE MICROELECTRONICS TECHNOLOGIES SUPPLIER DEVIATION REQUEST FORM

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