

REVISIONS				
REV	DESCRIPTION	DATE	ECO PREPARER	RELEASE APPROVAL
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ALL SHEETS ARE REV AK

**CURRENT DESIGN ACTIVITY CAGE CODE 26687
TELEDYNE ADVANCED ELECTRONIC SOLUTIONS
LEWISBURG, TENNESSEE 37091**


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<p>EXPORT CONTROLLED EAR RESTRICTED</p>	<p>QUALITY ASSURANCE PROVISIONS</p>		
<p>SEE INGENUUS FOR ELECTRONIC SIGNATURE RECORD</p>	<p>SIZE A</p>	<p>CAGE CODE 16170</p>	<p>DRAWING NO. 7700033</p>
	<p>SCALE</p>	<p>REV AK</p>	<p>Sheet 1 of 28</p>

TABLE OF CONTENTS

1.0 PURPOSE 3

2.0 QUALITY POLICY 3

3.0 SCOPE 3

4.0 DEFINITIONS 3

5.0 QUALITY PROVISIONS 5

6.0 PROHIBITED METALS 5

7.0 PURE TIN (Sn) FINISH PROHIBITION CERTIFICATION..... 5

8.0 VENDOR APPENDIX "A" 5

APPENDIX A: QUALITY PROGRAM PROVISIONS..... 6

QUALITY PROGRAM PROVISIONS (PURCHASE ORDER)..... 7

QUALITY PROVISIONS (Q.P Riders) 12

Table I. Element evaluation summary (MIL-PRF-38534)..... 18

Table I. Element evaluation summary (MIL-PRF-38534)..... 19

Table I. Element evaluation summary (MIL-PRF-38534)..... 20

Table I. Element evaluation summary (MIL-PRF-38534)..... 21

FIGURE 1 PURCHASE ORDER ATTACHMENT 27

FIGURE 2 PURCHASE ORDER ATTACHMENTS..... 28

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 2

1.0 PURPOSE

This document defines the specific requirements for an effective system to control the quality level for purchased products supplied to Teledyne Advanced Electronic Solutions, subsequently referred to as TAES. The quality of TAES 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

Management with executive responsibility has defined and documented the quality policy as follows:

It is our Quality Policy: To assure customer satisfaction, Teledyne Advanced Electronic Solutions (TAES) is dedicated to a never-ending commitment to continually improve the Quality of our products, processes, personnel and the satisfaction of our customers. It is our Quality Policy to "Ship defect free products in a timely manner to our customers". We accomplish this through:

- Products that consistently meet customer, statutory and regulatory requirements for performance and reliability
- Service to our customers that is prompt and courteous
- Deliveries that are on time
- Involvement and accountability of our entire management team

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 TAES.

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 electronic part: means an unlawful or unauthorized reproduction, substitution, or alteration that has been knowingly mismarked, misidentified, or otherwise misrepresented to be an authentic, unmodified electronic part from the original manufacturer, or a source with the express written authority of the original manufacturer or current design activity, including an authorized aftermarket manufacturer. Unlawful or unauthorized substitution includes used electronic parts represented as new, or the false identification of grade, serial number, lot number, date code, or performance characteristics.

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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 3

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) means a company that manufactures products that it has designed from purchased components and sells those products under the company's brand name.

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 TAES-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 TAES which is also the referenced as the Vendor.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 4

Vendor: Refer to the definition of Supplier.

Waiver: A form used by the Supplier to request authorization from TAES to ship noncompliant product to TAES when TAES 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 16 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 TAES website to all suppliers that TAES requests a quote.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 5

APPENDIX A: QUALITY PROGRAM PROVISIONS

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 6

EXPORT CONTROLLED – EAR RESTRICTED
Teledyne Proprietary Information

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. DOCUMENT REVISIONS

Unless specifically noted, specifications and/or drawings referred to in the Purchase Order shall be the revision in affect as of the date of the Purchase Order acceptance.

2. All data, certificates, and correspondences shall be provided in English.

3. NONCONFORMING MATERIAL

Seller is not authorized to perform Material Review Board (MRB) disposition of nonconforming material, with the intent of delivering such nonconforming materials without expressed written authorization from the Buyer. Departures from drawings and specifications shall be approved by Buyer prior to shipment. Supplier shall submit Form PF1359, 'Supplier Deviation Request' to the Buyer for processing at the Buyer's facility.

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 AES approved Action Directives

5 SUPPLIER DEVIATION REQUEST

Exceptions to the requirements as specified in this document must have written approval by TAES 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 TAES's Form PF1359, 'Supplier Deviation Request.'

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 7

6 COUNTERFEIT RISK MITIGATION

The supplier shall have in place a **Counterfeit Risk Mitigation Plan** that conforms to 252.246-7007 “Contractor Counterfeit Electronic Part Detection and Avoidance System. The clause is available at <http://farsite.hill.af.mil>. The Supplier shall flow down this criteria to its suppliers to avoid use of material purchased from unauthorized sources.

Seller shall maintain a counterfeit item risk mitigation process internally and with its suppliers in compliance with the requirements set forth within. Seller represents and certifies that any and all electrical, electronic, and electromechanical parts (hereinafter “Parts) supplied and delivered to Buyer by Seller under this purchase order are new and authentic and are not counterfeit and that the Parts have not been marked or remarked to disguise or falsely represent the identity of the manufacturer. Seller is not authorized to deliver any item procured from sources other than the Original Component Manufacturer (OCM), or their authorized distributors without prior written authorization from Buyer in writing. Seller shall demonstrate that parts are new and authentic by providing an unbroken supply chain trail from original manufacturer via original Certificate of Conformance (C of C). Use of Un-franchised parts is prohibited unless Buyer authorizes procurement in writing.

7 QUALITY MANAGEMENT SYSTEM

The Seller’s Quality Management System shall be in accordance with the current revision of AS9100, ISO 9001 or equivalent approved Quality Management System. Teledyne Quality Assurance reserves the right to conduct an audit and / or review / investigation on uncertified Suppliers.. If Seller loses its registration status by third party, it shall notify Teledyne’s Quality Assurance within three (3) days of receiving such notice.

8 ACCESS TO FACILITY

Seller shall allow Access to Teledyne EMS, its Customer, and any Regulatory authorities to all facilities involved in the order and to all applicable records. A formal Request of the visit would be coordinated in a timely manner for all parties.

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 five years after date of delivery unless otherwise defined by contract. All related documentation shall at a minimum be retained for seven (7) years for class “K/S” and five (5) years for class “H/B” and all other products. All retained data must be retrievable within seventy-two (72) hours when requested by Teledyne.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 8

10 SUPPLIER RATING SYSTEM

Teledyne maintains a supplier performance rating system. Purchasing rates the Supplier performance in the areas of on-time delivery and quality.

The minimum acceptable OTD rating is 90% and is calculated based on the number of units delivered on-time divided by the total units shipped. The minimum acceptable quality rating is 300 PPM and is calculated based on the number of units rejected divided by the number of units received, multiplied by 1,000,000. See Calculation examples below.

A. OTD Calculation Example: 25 units delivered on time/50 units shipped= 50%

B. Quality Calculation Example: 25 units rejected/1000 units received=.025 * (1,000,000) = 25,000 PPM)

Supplier performance is calculated at the beginning of each month based on the prior month’s delivery & quality information. Suppliers whose monthly rating in either of the performance areas identified above falls below the acceptable minimum requirements for three consecutive months, will be required to respond to a Vendor Corrective Action Request (VCAR).

11 RESPONSIBILITY FOR COMPLIANCE

Supplier is fully responsible for ensuring compliance to all the requirements of the Purchase Order including referenced Section II Quality Rider Provisions listed herein as specified on the Purchase Order. Performance of inspection and test by Teledyne’s representatives or Teledyne’s Customer representatives at either the Buyer’s or Seller’s facility shall not relieve the Seller of responsibility to furnish items which conform to the requirements of the procurement document. Supplier shall control sub-tier procurements. Quality Riders included in the Teledyne Purchase Order and Customer requirements shall be flowed down to Supplier’s sub-tier suppliers. Objective evidence of sub-tier control shall be available for review by Teledyne at reasonable requested times.

12 SUPPLIER AWARENESS

Supplier shall inform their employees and sub-tier suppliers of their contribution to product or service conformity and product safety. Suppliers are responsible for ensuring that all personnel are competent to perform work and be ethical in all actions.

13 FOREIGN OBJECT DAMAGE / ELIMINATION (FOD) CONTROL

The Seller shall establish and maintain an effective Foreign Object Damage (FOD) Prevention Program to reduce FOD. NAS412 and AS9146 may be used as a guideline. The program shall utilize effective FOD prevention practices. The program shall be proportional to the sensitivity of the design of the product(s) to FOD, as well as, to the FOD generating potential of the manufacturing methods.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 9

14 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.

15 CHANGE OF PRODUCT, PROCESS, OR FACILITIES

Seller/Manufacturer shall not implement any major changes in design, materials, processes or control without prior submission to the Buyer for review and approval. Major changes shall be defined as any change affecting performance, quality, reliability, ESD class or interchangeability. The intent of this requirement is to ensure all material supplied under this order will be homogeneous and the performance, reliability, and quality of the material is not degraded. Changed items shall be clearly identified and in a manner different from the original items. Buyer shall be notified of any production/manufacturing change in facilities locations.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 10

16 CERTIFICATE OF CALIBRATION

The Supplier is responsible for the calibration, accuracy, validation, and maintenance of any equipment, tooling, or gages utilized by the Supplier to produce, inspect, or test articles to be delivered under this Purchase Order. The calibration system shall be in accordance with documented standards such as ISO 17025, MIL- STD-45662A, ANSI/NCSSL-Z-540-1, or ISO 10012-1. Traceability of such system shall be traceable to the National Institute of Standards and Technology (NIST).

Instrument, gage, tool, or equipment calibration reports must be provided to TAES when calibration service is being purchased from Supplier. 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.
- 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 11

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 (latest version) 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.

106 CUSTOMER DESIGNATED OR APPROVED SOURCES

Supplier shall utilize only customer-designated sources or approved external providers including special processes.

121. CERTIFIED SUPPLIER PROCUREMENT

TAES'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 inspect any or all of the work included in this order at the Supplier's Plant. During performance of this order, your Quality Control or Inspection System and Manufacturing Processes are subject to review, verification and analysis by authorized Government Representatives. Government or release of product prior to shipment is not required unless you are otherwise notified.

130. TELEDYNE SOURCE INSPECTION

Teledyne will perform In-Process or Final Source Inspection at a mutual agreed process. Notification of Source Inspection dates shall be made through Teledyne Purchasing and shall allow a minimum of three (3) working days for allocated travel for the Teledyne Quality Representative.

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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 12

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.

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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 13

134 RETENTION OF FIRST ARTICLE

The Vendor shall retain the first article(s) as objective evidence and make available to TAES upon request. Disposal of first article is prohibited until authorized by TAES in writing.

135 DELIVERY OF FIRST ARTICLE

The Vendor is required to deliver the first article to TAES 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

TAESs' source inspection to 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 14

152. LIMITED CALENDAR (SHELF) LIFE MATERIAL

(This clause was moved to mandatory clause #14 on 10/04/2018, however, TAES is leaving it as 152 in order for the current P.O.s with this QP Rider on them to be accepted at Receiving Inspection.) 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.

155. CHANGE OF PRODUCT, PROCESS, OR FACILITIES

(This clause was moved to mandatory clause #15 on 10/04/2018, however, TAES is leaving it as 152 in order for the current P.O.s with this QP Rider on them to be accepted at Receiving Inspection.) Seller/Manufacturer shall not implement any major changes in design, materials, processes or control without prior submission to the Buyer for review and approval. Major changes shall be defined as any change affecting performance, quality, reliability, ESD class or interchangeability. The intent of this requirement is to ensure all material supplied under this order will be homogeneous and the performance, reliability, and quality of the material is not degraded. Changed items shall be clearly identified and in a manner different from the original items. Buyer shall be notified of any production/manufacturing change in facilities locations.

156. CUSTOMER 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 15

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).

158. SUPPLIER OTHER THAN THE MANUFACTURER, DISTRIBUTOR

The Vendor or Seller other than the manufacturer, shall be otherwise be 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).

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 16

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

(This clause was moved to mandatory clause #16 on 10/04/2018, however, TAES is leaving it as 221 in order for the current P.O.s with this QP Rider on them to be accepted at Receiving Inspection.) The Supplier is responsible for the calibration, accuracy, validation, and maintenance of any equipment, tooling, or gages utilized by the Supplier to produce, inspect, or test articles to be delivered under this Purchase Order. The calibration system shall be in accordance with documented standards such as ISO 17025, MIL- STD-45662A, ANSI/NCSL-Z-540-1, or ISO 10012-1. Traceability of such system shall be traceable to the National Institute of Standards and Technology (NIST).

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.
- 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 17

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 the element evaluation, the attachment method for the component shall be conductive epoxy.

Note: When wire bond evaluation subgroup testing is required, 1 mil gold wire shall be used for the interconnection.

Table I. Element evaluation summary (MIL-PRF-38534)		
Element	Paragraph	MIL-STD-883
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 indicating 100% electrical test and visual inspection has been performed.

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

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

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 18

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 the element evaluation, the attachment method for the component shall be conductive epoxy.

Note: When wire bond evaluation subgroup testing is required, 1 mil gold wire shall be used for the interconnection.

Table I. Element evaluation summary (MIL-PRF-38534)		
Element	Paragraph	MIL-STD-883
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 (Room, Cold, Hot),
 - Interim electrical,
 - Post burn-in,
 - Final electrical
- ✓ Evidence of burn-in (240 Hours)
- ✓ Evidence of steady state life test (1000 hours),
- ✓ Actual bond pull results,
- ✓ Actual die shear results,
- ✓ Actual SEM analysis results, and
- ✓ C of C with statement indicating 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 19

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 the element evaluation, the attachment method for the component shall be eutectic attach.

Note: When wire bond evaluation subgroup testing is required, 1 mil gold wire shall be used for the interconnection.

Table I. Element evaluation summary (MIL-PRF-38534)		
Element	Paragraph	MIL-STD-883
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 indicating 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 20

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

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

Note: When wire bond evaluation subgroup testing is required, 1 mil gold wire shall be used for the interconnection.

Table I. Element evaluation summary (MIL-PRF-38534)		
Element	Paragraph	MIL-STD-883
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 (Room, Cold, Hot),
 - Interim electrical,
 - Post burn-in,
 - Final electrical
- ✓ Evidence of burn-in (240 Hours)
- ✓ Evidence of steady state life test (1000 hours),
- ✓ Actual bond pull results,
- ✓ Actual die shear results,
- ✓ Actual SEM analysis results, and
- ✓ C of C with statement indicating 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 21

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 TAES 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 Advanced Electronic Solutions, 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 TAES 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 22

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

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 Advanced Electronic Solutions, 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

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 23

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 Advanced Electronic Solutions, Lewisburg, TN Facility. Final acceptance of the lot will be contingent upon test results.

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](#).

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 24

281 COMPLIANCE TO DFAR SPECIALTY METALS CLAUSE


Any specialty metals incorporated in articles delivered under this contract **shall** be melted in the U.S., its outlying areas, or a qualifying country listed in DFARS 252.225.7008 & 252.225.7009 imposed in regards to specialty metals as applicable. Exemptions to requirements of the above clauses may exist, as outlined in the clauses themselves or by operation of applicable Department of Defense Domestic Non-Availability Determinations (DNAD) posted on its public web site for that purpose.

The supplier's C of C **shall** state the articles delivered under this contract are "Compliant to DFARS 252.225.7008 & 252.225.7009 ".

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

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

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 25

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

293. BEST COMMERCIAL PACKAGING

Packaging and packing shall be in accordance with best commercial practices. Methods used shall be sufficient for protection against damage from normal handling, shipping, and storage conditions. ESD precautions shall apply as applicable.

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 Advanced Electronic Solutions.
- 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.

SIZE A	CAGE CODE 26687	DRAWING NO. 7700033
SCALE	REV AK	Sheet 26

