

Quality Assurance Clauses (QAC)

Applicable Quality Assurance Clauses are referenced on the Purchase Order

The following Quality Assurance Clauses (QACs) are an integral part of the TTM Technologies San Diego Division Purchase Agreements. These provisions supplement the existing Terms and Conditions of the Purchasing Agreement. Each Supplier/Service Provider listed on the TTM San Diego Division's Approved Vendor List (AVL), shall review this document and establish and maintain (as applicable) documented procedures for ensuring control and compliance to the specified clauses listed for their Supplier Classification. Suppliers / Service Providers requesting exceptions to specific clauses must submit a written request to the TTM-SD Quality Department.

C-1: Quality System Requirements

- A) Sampling procedures, when used must comply with ANSI NCSL Z540-3 or equivalent.
- B) The supplier must maintain a "Lot Control System" and traceability records as applicable. Multiple lots supplied against this PO in a single shipment must be segregated and identified. Packaging, labeling, and certifications must clearly indicate individual lot quantities.
- C) At minimum the Suppliers Quality System must be in compliance with ISO 9001 or AS9100.
- D) The supplier is required to notify TTM-SD immediately if non-conforming product was inadvertently shipped to TTM-SD.
- E) The supplier is not allowed to ship non- conforming product dispositioned as "USE AS-IS" or repaired without prior approval from TTM-SD.
- F) The Supplier is required to flow down to all sub-tier suppliers all applicable requirements in the purchasing documents, including Key Characteristics on applicable drawing(s).
- G) Verification of Purchased material by the supplier at a sub-tier supplier's facility does not absolve them from providing acceptable material. Such material must be submitted and accepted to standard inspections and testing by TTM-SD.

C-2: Certification

The supplier shall provide with each shipment Certificate of Conformance signed with an original signature and title of signer for the total quantity in the shipment. NOTE the supplier must certify to all applicable requirements of A thru D.

- A) If special processes are required the certification must reflect the applicable specification and list the special processes certification.

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B) If special inspection processes are required:

- The certification MUST indicate the quantity in the lot, quantity inspected and the inspection results
- A test report with the applicable information must accompany the certification.

C) For chemical, electrical and/ or mechanical properties when shipping raw materials the certification must reflect the analysis and/or the information must be on a separate report accompanying the certification.

D) Certification requires (if applicable) proof of qualification for special processes performed by qualified personnel.

C-3: Right to Access by TTM-SD /Government Customers/Regulatory Authorities

All material covered by this purchase order is subject to surveillance inspection by TTM-SD, GOVERNMENT CUSTOMER, REGULATORY AUTHORITIES. This requirement may include surveillance of the product or the supplier's Quality System, procedures and facilities. The supplier shall provide access to all facilities and equipment, supply data and perform test as required by the applicable drawings, specifications and inspection instructions under the surveillance of TTM-SD Quality Assurance Representative, GOVERNMENT/CUSTOMER and REGULATORY AUTHORITIES, as requested. The surveillance inspection will be requested in advance in writing by TTM-SD.

C-4: Source Inspection

Material covered by this purchase order may be subject to inspection at the supplier's facility by TTM-SD prior to shipment. The supplier shall furnish the necessary facilities and equipment, supply data and perform test as required by the applicable drawings, specifications and inspection instructions under the surveillance of TTM-SD Quality Assurance Representative, as requested. A seven day notice must be given to TTM-SD buyer as to when the material will be ready for inspection to allow for scheduling of source inspection.

C-5: First Piece Inspection

First Piece (Qualification) is required on the first lot produced against this Purchase Order. This inspection will be performed by the supplier in accordance with AS9102 current revision. All supporting documentation including raw material certification must be supplied with the first shipment. The first piece inspection must meet all of the requirements of the purchase order. Once the first lot is accepted the supplier shall make NO CHANGES to the process or material used without written authorization from TTM-SD.

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The First Piece Inspection will need to be resubmitted if any of the following events occurs:

1. A lapse in production for more than 2 years.
2. Supplier changes sub-tier suppliers, processes, inspection methods, location of suppliers facility, tooling or materials that can potentially affect form, fit or function.
3. A natural or manmade event which may affect the manufacturing process.
4. A changed in design affecting the form, fit or function of the part.
5. A change in numerical control program or translation to another media.

C-6: Dimensional Samples

A dimensional sample of the material produced against this purchase order is required prior to production. Inspection of this sample will be arranged by the TTM-SD. The dimensional report, along with the sample(s) will be submitted to TTM-SD Quality Assurance for inspection and approval. The production run will not commence until approval has been given by TTM-SD. TTM-SD may, at their discretion OPT to witness the inspection of these samples at the supplier's facility. Notification to TTM-SD is required prior to the fabrication of the samples. Once approval has been given, the supplier shall make NO CHANGES to the process or material used without written authorization from TTM-SD.

C-7: Supplier Furnished Inspection and Test Data

A copy of the supplier's actual recorded inspection and test results for the material produced against the purchase order must be provided to TTM-SD for the product delivered for each shipment. The data must comply with the requirements of the applicable drawing and/or specification. The data recorded must have positive identification with the product being supplied with that shipment.

C-8: Tool, Gage and Measuring Equipment

The supplier shall maintain a system that will ensure adequate controls over all tools, gages, measuring and testing equipment that will be used for product acceptance in accordance with ANSI NCSL Z540-3 or equivalent. Calibrations must be traceable to the National Institute of Standards and Technology (NIST). Calibration will be to manufacturer's specification unless specified. NOTE tools, gages, measuring and testing equipment supplied by TTM-SD must be maintained in accordance with that system as well. The Certificate of Calibration must include, as a minimum, the following:

1. Title: "Certificate of Calibration"
2. Identification of the calibration service

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3. Certificate identification (unique identification of the C of C)
4. Customer (TTM Technologies Inc., San Diego, CA)
5. Identification of the calibration procedure used
6. Description and/or Part name
7. Status of the instrument upon receipt from Customer, to be indicated on the C of C indicating tool is “*in-tolerance*” or tool is “*out-of-tolerance*”
8. Identification and calibration status of the equipment and standards used in performing the calibration
9. Calibration completion date
10. Calibration interval and next calibration due date
11. Calibration results with units of measurement, where appropriate
12. Calibration results before and after adjustment or repair, if available
13. Calibration actions taken (i.e.: adjusted, repaired, new value assigned, limited, de-rated, modified, etc.), as applicable
14. Limitations of use, if applicable
15. Person authorizing the calibration certificate (report)
16. Statement of measuring traceability
17. Factors and conditions under which the calibration(s) were performed that have an influence on the measurement results
18. Uncertainty of measurement, where appropriate, and/or a statement of conformance

C-9: Government/Customer Source Inspection (On Site Inspection)

When Government or Customer Source Inspection is required, it will be so stated in the body of the purchase order, along with the pertinent instructions.

C-10: Retention of Documentation

The Supplier is required to maintain records of acceptance activities for services performed and/or products and services delivered to TTM–SD. These records may include, as appropriate, test/inspection criteria, revision level of documents/equipment/software used, operating procedures (planning, routing or Traveler sheets), dates of test/inspection, and the results. The records required shall be retained for a minimum of 7 years from the close of the contract. These records are subject to TTM-SD review, and must be available at the Subcontractor's facility, upon request.

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C-11: No Change Clause

Supplier shall make no change in design, manufacturing or assembly processes or source of supply, after approval of the first production test item or after acceptance of the first completed test item without written approval of the buyer.

Changes proposed by the Supplier, both material and process, which may affect form, fit, function, reliability, serviceability, performance, regulatory compliance and safety must be submitted in writing 90 days in advance of such change. This includes, but is not limited to, discontinuance of supply of any materials to this division, changes of sources of material and/or parts, changes in manufacturing processes, test procedures, mfg. locations, relocation or replacement of equipment and any similar changes that are anticipated by Sub-Tier Suppliers. Items affected by such changes may not be delivered to TTM-SD until the Supplier has received written approval for the changes from TTM-SD. At a minimum, the change notice must include the Supplier's affected part number or software revision (if applicable), date of implementation, reason for the change, specific details of the change and, if available, supporting data that demonstrates the change will not negatively affect TTM-SD's process compatibility. In addition, TTM-SD reserves the right to request samples for evaluation prior to approval.

C-12: Shelf Life of Materials

The Date of Manufacture and Shelf Life Expiration Date shall be clearly marked on the item and/or packaging adjacent to batch/lot number identification. Eighty percent of the Shelf Life is required upon receipt.

C-13: Material Certification

The supplier shall furnish certification for the materials used in the process. In addition, supplier's Certificate of Conformance will reflect products were manufactured/processed using this material. Documented reports shall include as a minimum, the following information:

1. Subcontractor/Supplier Name
2. Purchase Order Number
3. Part Name and Description
4. Lot Number / Batch Number
5. Manufacturing Specification (IPC/MIL Spec, if applicable) (excluding chemicals)
6. Manufactured Date (if applicable)
7. Material Expiration Date (if applicable)
8. Quantity – (By Date Code, if applicable)

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9. Unit of Measure
10. Date and Signature of Authorized Company Representative
11. Statement certifying compliance of material, including traceability to applicable specs.
12. When special processes are required by drawing or specifications, specific Certificate of Compliance to applicable military and/or Customer specifications are required, including revision.

C-14: Lot/Date Code Control

Components must be supplied in one lot. Components being supplied with multiple date codes must have a date code within a 12 month period. The date code shall be recorded on the certificate of conformance.

C-15: Quality Records

A) Quality records shall be maintained in a manner to ensure they remain legible, readily identifiable, and are easily retrievable. Quality Records shall be maintained for a period of no less than 7 years from the date of purchase. Said records shall be available for review by TTM-SD, TTM-SD's customers, and/or any applicable regulatory authorities upon request. Disposal of records shall be done in a manner that shall prevent reconstruction.

B) The commodities/technical data shared with the supplier are controlled under the

United States Export Regulations and may not be exported to a foreign person, either in the U.S. or abroad, without the proper authorization of the U.S. Department of State or the U.S. Department of Commerce. Please contact TTM Technologies San Diego. for commodity classification and jurisdiction.

C-16: Foreign Object Elimination

The Seller shall establish and maintain an effective Foreign Object Damage (FOD) Prevention Program to reduce FOD. The material supplied to TTM-SD shall be manufactured in an environment that is free of foreign objects. Material supplied shall be free of foreign objects. The Seller's 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. The written procedures or policies developed by the Seller shall be subject to review, upon request, by TTM-SD, and disapproval when the Seller's procedures or policies do not accomplish their objectives.

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C-17: ITAR Compliance

The Supplier/Service Provider/Recycler must be ITAR (International Traffic in Arms Regulations) compliant and provide evidence, upon request, that personnel who are within the facility or supply a service to TTM-SD product are either U.S. citizens or permanent residents. If the Supplier performs work on ITAR product, or has access to ITAR data/drawings/documentation, that Supplier must also be registered with the DDTC (Directorate of Defense Trade Controls).

C-18: Packaging Requirements, including Bar Coding of Boxes, Bags and Packing Slips

The Subcontractor shall establish and maintain a documented system for the control and monitoring of its packaging and shipping practices with provisions for handling, preservation, storage, packaging, and final shipment. The system must be designed to insure the quality of deliverable material through prevention of damage, deterioration and degradation. Packaging requirements are as stated on the purchase order. When not specified, the method used will be "best commercial practices". All laminate and prepreg materials are to have individual boxes/bags identified with readable bar codes. Information required includes; TTM Part #, Qty of pieces, and Lot #. All laminate and prepreg require packing slips with readable bar codes. Information required includes TTM PO #, TTM Part #, and total Qty of pieces for the specific part #. The order of these bar codes is important as the receiving and issuing programs flow in this order. The use of bar codes for other materials/supplies, although not required, is encouraged for boxes and/or packing slips

C-19: Counterfeit Materials

The supplier will be able to verify authenticity of items supplied to TTM-SD and will conform to governing standards. Seller shall not deliver products that contain counterfeit items (such as, but not limited to software, material and electrical/mechanical parts/ assemblies). SAE AS5553 provides guidance for counterfeit prevention.