

**Supplier Quality Requirements for Purchased Materials or Service**

1. **Scope.** This supplier quality requirements documents defines the terms and conditions relating to the quality of materials or Services supplied to Sanmina that are used in Product (defined as products manufactured and sold by Sanmina) or in the production of Product. The requirements herein apply to all Supplier(s) and their sub-tier Suppliers of materials and Services provided to any Sanmina operation. Supplier shall supply materials and/or Services in compliance with the terms stated herein. No deviation or exceptions apply unless mutually agreed upon in writing with an authorized Sanmina representative. It is Supplier's responsibility to review and fully understand the requirements herein before accepting a Sanmina purchase order. In some cases, Supplier will be required to comply with additional Sanmina requirements that may not be covered specifically in this document or that may differ from the requirements referenced herein. In these cases Sanmina will communicate and document the mutual agreement of said requirements utilizing Sanmina form QAF-0069-C.
2. **Order of Precedence (with respect to Quality Requirements only)**
 - 2.1. Purchase Order
 - 2.2. Engineering drawings
 - 2.3. Engineering and material specifications
 - 2.4. QAF-0069-C "Acknowledgement of Supplementary Supplier Quality Requirements for Purchased Materials or Services"
 - 2.5. Sanmina Master Supply Agreement (if any) - Note: the terms of the Master Supply Agreement will take precedence over only the pre-printed terms contained on each Purchase Order.
 - 2.6. QAF-0082-C "Supplier Quality Agreement for Purchased Materials or Services"
 - 2.7. QAR-0001-C "Supplier Quality Requirements for Purchased Materials or Services"
3. **General Requirements**
 - 3.1. Unless otherwise specified and approved by Sanmina, Supplier is required to have an applied Quality Management System (QMS) in place that is operated in accordance with and accredited by a third party certification body to the current version of the standard such as ISO 9001, TL 9000, IATF 16949, ISO 13485, or AS 9100. Accredited certification is to be furnished to Sanmina upon request.
 - 3.2. Unless specified otherwise and where applicable, Supplier shall be in compliance with the latest revision of applicable standards including but not limited to JEDEC, IPC, ANSI, and SAE.
 - 3.3. Supplier shall acknowledge and implement the [RBA \(Responsible Business Alliance\) Code of Conduct](#).
 - 3.4. The United States of America has determined that goods produced in the Xinjiang Uyghur Autonomous Region of the People's Republic of China (XUAR) can be presumed to have been produced by forced labor (per the Uyghur Forced Labor Prevention Act). Supplier shall ensure that their product, or material or component used in the production of their product, are not produced in the XUAR.
 - 3.5. Upon request, Supplier shall provide all appropriate product certifications including all applicable safety, regulatory, and operating systems certifications at Supplier's sole cost and expense.
 - 3.6. Evidence of certification to the applied QMS and successful completion of surveillance audits shall be supplied to Sanmina upon request.
 - 3.7. Sanmina is committed to achieving third party registration to ISO 14001, the internal standard for environmental management systems in its worldwide manufacturing operations. The goal is to provide Sanmina's Product(s) that are environmentally sound throughout their life cycles. Supplier shall operate in an environmentally responsible manner. Sanmina encourages Supplier to scrutinize its manufacturing processes, identify potential hazards, and use preventive measures to reduce or eliminate potential hazards. All waste material that is generated is to be disposed of in compliance with applicable laws.
 - 3.8. Supplier shall have a disaster recovery and business contingency plan in place that minimizes the risk to Sanmina in the event of a natural disaster, labor dispute, or other disturbances in the supply chain. Evidence of the process shall be made available for review upon request.



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- 3.9. Supplier shall improve its processes, systems, and performance and sustain both internal and external quality levels of its Material (or Service) using improvement techniques such as six-sigma, lean manufacturing, and/or other techniques consistent with that of the industry.
- 3.10. Supplier has implemented anti-counterfeit procurement measures that includes close oversight and inspection to successfully eliminate counterfeit parts from the supply chain.
- 3.11. Material shall comply with specified Sanmina specifications or, if not specified otherwise by Sanmina, with Supplier's specifications effective at the time of receipt of Sanmina purchase order.
- 3.12. Material manufactured date codes of supplied Material shall not exceed 24 months at the time of Material receipt by Sanmina unless agreed upon in writing prior to purchase order release. In some cases commodities will have shorter shelf life requirements and should be specified per the industry standard guidance for that commodity. Material shall have a minimum of 6 months remaining on material before date code expiration. Sanmina requirements may also dictate shorter shelf life requirements and will be communicated to Supplier at the time of PO release of those exceptions.
- 3.13. Supplier shall maintain a first in, first out ("FIFO") inventory control system to ensure that non-conforming Material or prior Product versions or down-rev Product is not inadvertently shipped to Sanmina.
- 3.14. Supplier shall permit Sanmina and/or its representatives, consultants, customers, or regulatory authorities to enter Supplier's facilities upon 24 hours notice, except for emergencies where there shall be no notice period at reasonable times to inspect and/or audit such facilities and QMS including records, and any goods, inventories, machinery and equipment, or other items or processes used to manufacture Sanmina Product as it relates to Supplier's performance to this document.
- 3.15. Supplier will ensure that Sanmina has the same rights of access with prior notice to any subcontractors of Supplier who are involved in the supply of the products for the purpose of carrying out an audit.
- 3.16. Supplier shall provide written responses and summaries of actions as a result of audits, corrective action requests, or escalations raised by Sanmina.
- 3.17. It is Supplier's responsibility to install any additional processes, tests, or methods in order to fulfill customer requirements.
- 3.18. Supplier shall maintain and execute internal audits of its operation to insure compliance with written processes, procedures, standards, and agreements.
- 3.19. Sanmina reserves the right to perform periodic Supplier performance reviews; measuring and providing feedback to Supplier in terms of quality, performance, delivery, cost, responsiveness, and communication. These reviews shall be performed as part of continuous improvement strategies. Supplier is expected to participate in these reviews, in scheduled quality meetings and when necessary provide corrective action plans to improve performance, as required and at its expense.
- 3.20. Supplier Certification:
 - 3.20.1. Supplier acknowledges that certification may require an audit by Sanmina to assess Supplier's capability to provide Material(s) or Service(s). Certification audits may be conducted without Sanmina visiting Supplier's site; however, Sanmina reserves the right to require an onsite audit before providing a certification.
 - 3.20.2. Certification is contingent upon Supplier performance and Sanmina reserves the right to change the certification at any time.
- 3.21. Changes to Supplier's quality management system or any significant organizational changes shall be communicated to Sanmina immediately.
- 3.22. Ensure all employees are aware of their contribution to product and service conformity, their contribution to product safety and the importance of ethical behavior.
- 3.23. The Supplier shall maintain records which show that the Material compliance with the part specification for either a minimum of five (5) years from date of manufacture or as stated on purchase order whichever is longer.
- 3.24. Supplier shall establish, document, and maintain a Foreign Object Debris/Damage (FOD) prevention program with the objective of providing FOD free material in the fulfillment of all Purchase Orders.
- 3.25. Supplier shall ensure that all applicable specification and requirements are flowed down to sub-tier suppliers i.e., those providing machining, plating, or painting operations, etc...

**4. Shipping, Packaging, and Labeling Requirements**

- 4.1. For Material that is to be imported into the United States of America, Supplier shall comply with all applicable recommendations or requirements of the Bureau of Customs and Border Protection's Customers-Trade Partnership Against Terrorism ("[C-TPAT](#)") initiative. Supplier, upon request shall provide evidence of compliance with the C-TPAT initiative.
- 4.2. All electro-static sensitive devices (ESD) shall be properly packaged to provide protection from electrostatic discharge and in accordance with JEDEC Standard [JESD625](#) latest revision. All ESD sensitive products shall be clearly identified with an ESD warning on each tray, tube, or tope and reel within the shipment.
- 4.3. Material packaging shall not negatively influence Material quality or include any impurities.
- 4.4. Moisture Sensitive Devices as identified by Supplier shall be labeled and packaged per the following:
 - 4.4.1. All Product shall be packaged in an ESD Moisture Barrier Bag (MBB)
 - 4.4.2. Each MBB shall be labeled per Sanmina labeling requirements as indicated below:
 - Each MBB shall be labeled in compliance to JEDEC standard [J-STD-033](#) and at a minimum include moisture level, original seal date, and re-baking requirements.
 - Humidity Indicator Card (HIC) shall be inserted in each MBB indicating devise moisture exposure.
 - 4.4.3. All moisture sensitive devices shall comply to JEDEC standards [J-STD-033](#) and [J-STD-020](#).
- 4.5. Material supplied in tape and reel or tray shall comply with EIA industry standard specifications to ensure proper use in automatic component placement machines.
- 4.6. All products shall, where possible, be labeled per QAR-0069-C Supplier Traceability Requirements for Purchased Material
- 4.7. All product packing slips shall contain material declaration for products of and for the electrotechnical industry in accordance with IEC 62474:2012 or IPC1752A which shall be attached to the hardcopy as an attachment
- 4.8. As per J-STD-609B as applicable, all components shall have the outer packaging, carton, boxes and/or inner package material (tray, tube, and reel) marked with traceable information that indicates the compliance aspects, such as the 'No lead, Cadmium, Mercury', etc.
- 4.9. All raw material supplied on this order must be identified with the applicable specification, type, condition, and manufacturer of materials.

5. Quality Acceptance Requirements:

- 5.1. Sanmina and Supplier's goal is to achieve and maintain a zero defect level for Incoming Quality Level (IQL). IQL measured in parts per million (PPM) is an ongoing measurement reviewed regularly by Sanmina. If deemed appropriate by Sanmina, mutually agreed upon interim targets shall be defined and communicated to Supplier in order to achieve the zero defect target. All items on this order shall be fabricated, processed and finished in such a manner as to be uniform in quality and appearance and free of defects.
- 5.2. Supplier shall use statistical process controls and a supporting process capability analysis to achieve continuous quality improvement and failure rate reductions. Supplier shall, upon request, provide Sanmina with evidence of such process controls and capabilities, including all supporting documentation.
- 5.3. Sanmina may define the method used in reporting quality goals and the means of expressing the results such ad DPPM (defective parts per million) or percentages.
- 5.4. Failure to meet quality targets (with a zero defect approach) as defined by Sanmina over a reasonable and sustained period of time will require Supplier's participation in a quality improvement program as defined by Sanmina. Upon request, Supplier shall furnish quality control plans as agreed to by Sanmina.
- 5.5. Supplier shall maintain and make available upon request outgoing quality inspection, reliability records, and applicable data as defined within this document for a minimum of five years from the date of goods shipment.
- 5.6. Failure by Supplier to drive strategies to achieve zero defect targets may result in the removal of Supplier from the Approve Supplier List.
- 5.7. Supplier shall provide traceability by either lot or date code or where appropriate serial number for purpose of tracing any suspect shipment containing problems.



- 5.8. Supplier shall add a certificate of conformance for each shipment which shall include as a minimum the following items:
- Confirmation, that the delivered material is in full compliance with the specification.
 - General information as mentioned in Section 4 (Shipping, Packaging, and Labeling Requirements).
 - Applied tests and the results required by the Purchase Order.
 - Authentication statement as per section 11.04
- 5.9. Supplier shall add to the certificate of conformance for each shipment of printed wiring board the following items:
- An electrical test certification signed by the test manager or equivalent will be required with each lot. The document will contain thresholds and voltages used.
 - An impedance certification signed by the test manager or equivalent will be included with the lot if applicable. A sample log file from the tester shall be included with the product.
 - PCB Surface Finish measurement data and Certificate
 - Solder Sample.
 - Dimension inspection report
 - Hole size verification report
 - Ionic Contamination (Cleanliness) Test Results Report. The readout strip is optional.
 - Additional PCB coupons shall be delivered, as required.
 - Microsection Report that includes all relevant thickness measurements and characteristics per IPC-A-600, IPC 6012, IPC 6013 and any referenced document specified on the part drawing or Purchase Order.
 - Material Certs that include all laminates, prepregs, foils, soldermask, legend inks, special chemicals or materials, etc.
 - Any outside lab reports, as required by customer or governing authority
- 5.10. Supplier shall supply the Hazardous Material Identification System (HMIS) and the Material Safety Data Sheet (MSDS) with the material with the initial order and upon each subsequent change. Supplier shall consider changes in Sanmina's restricted and declarable substance list RoHS-F022.
- 5.11. Supplier shall furnish certification of Country of Origin with each shipment.

6. Product Change and Discontinuance Notification

- 6.1. Supplier shall notify Sanmina of all proposed changes that impact the form, fit, function, quality, reliability, process, product, services or status of the Material with regard to environmental legislation such as (by way of example and not limitation) the EU Directive 2011/65/EC on the restriction of the use of certain hazardous substances (collectively all environmental legislation to be referred to herein as "ROHS"). Notification shall be provided via an engineering and/or process change request per J-STD-046. Changes affecting a significant amount of parts defined as greater than fifteen part numbers shall be accompanied with an Excel file listing those affected part numbers. All Supplier notifications shall be sent to Sanmina via email to the following Sanmina address: pcn.eol@sanmina.com. The types of changes, as an example, requiring notification include, but are not limited to:
- Changes in components (die shrink, etc.)
 - Reduced inspection and/or testing
 - Manufacture site changes
 - Deviations from the MT&Q plan
 - Changes in packing, shipping and labeling of Product or containers
 - Product discontinuance
 - Changes in Supplier or Manufacturer part number or name
 - Changes to software or firmware
 - Work transfer from the organization to an external provider, or from an external provider to another external provider
- 6.2. Supplier, at a minimum, will provide ninety days prior written notice before any change implementation to afford Sanmina the means of determining approval for such changes that ultimately affect Sanmina's end customer.



- 6.3. Supplier shall provide written notice of planned product discontinuation per JEDEC standard [J-STD-048](#) and specifically in accordance with the following timeframes:
 - 6 months minimum from the notice for last order dates.
 - 12 months minimum from any discontinuation to manufacture material or from final shipments whichever is a greater period of time.
- 6.4. Supplier shall maintain internal documentation for all ECNs and ECOs for a period of no less than five years (or greater as requested by Sanmina) for commercially used Product.
- 6.5. Where applicable, Supplier shall continue to provide the Product under ECO control including hardware level, firmware version, BIOS version, programmable devices versions, driver version, application version, factory utilities, user/product documentation and diagnostics support that have been qualified by Sanmina until such time as Sanmina qualifies a later version at Sanmina's discretion. In the event of the discovery of a high severity issue in Supplier's Material, at Sanmina's discretion, Supplier shall provide the currently-qualified Product revision with only the specific issue fix and re-certify the fixed product on an emergency basis to minimize the re-qualification effort and response time to correct the problem in the field and/or at the manufacturing facility.
- 6.6. Where applicable, Supplier shall provide Product revisions in support of subsequent standards revisions, operating system updates, and versions including support packs, service releases, and full releases of operating systems in the same family of operating systems as previously supported. This shall include (by way of example and not limitation) all required Product modifications of hardware, BIOS, firmware, programmable devices, drivers, utilities, and applications.
- 6.7. Sanmina has the right to reject any and all intended changes required by Supplier.
- 6.8. Supplier may be required to cover any re-qualification costs at Sanmina or customer site as a result of product changes or product obsolescence initiated by Supplier.
- 6.9. Supplier shall maintain procedures for change notification to Sanmina which are in accordance with this agreement.

7. Product Quality Notification

- 7.1. Where Supplier suspects that non-conforming Product may have been shipped to Sanmina, Supplier shall immediately provide written notification to the Sanmina Global Supplier Manager and the buyer that placed the purchase order for the Product.
- 7.2. When Supplier identifies non-conforming Product prior to shipment and wishes to obtain concession or deviation permission for its use, release or acceptance, Supplier shall immediately provide written request to the buyer that placed the purchase order for the Product and obtain Sanmina's final disposition of the non-conforming product applicable to that purchase order.

8. Expectations When Failures Occur - Failure Analysis and Correction Action

- 8.1. Supplier shall have a written corrective action procedure in place that responds to complaints received from any Sanmina operation. To assure timely resolution of non-conformance issues, Supplier shall apply appropriate problem-solving techniques to identify root causes and implement permanent corrections. The supplier is required to utilize appropriate methods such as PDCA-FTA or equivalent in order to develop appropriate problem analysis. In addition, Supplier shall use statistical methods where applicable to verify that the corrective action implemented has corrected the problem and the process is in control and continues to produce material that is within specifications.
- 8.2. When a non-conformance is identified, Sanmina will request a thorough, documented root cause / corrective action plan be put in place. Sanmina will notify Supplier of the non-conformance via Sanmina Supplier Corrective Action Request (SCAR). In compliance to JEDEC standard [JESD671](#) latest revision, Supplier is expected to address the following when a SCAR is issued for resolution:
 - Initial Problem Definition and Verification
 - Containment Action
 - Defect Verification



- Definition and Verification of the Root Cause
 - Permanent Corrective Action
 - Corrective Action Verification
- 8.3. The timeframe of the response for the corrective action shall be in accordance with Table 1 in [JESD671](#) latest revision or as otherwise reasonably requested by Sanmina. The overall response time line is 9 days for urgent and 23 days for standard.
- 8.4. “Urgent” is typically defined as a non-conformity that is from the field, poses a safety threat, or causes line stops or stop-ships. However, Sanmina may use its reasonable discretion to identify any issue as an urgent issue. Urgent or standard priorities will be communicated in the formal SCAR to Supplier at the time of issuance.
- 8.5. Supplier is expected to provide support as required by Sanmina including but not limited to on-site representation for failure analysis, to assist in the isolation, diagnosis, and resolution of high severity issues in the field, factory, or development facility, and new Product introduction support.
- 8.6. In the event that nonconforming Material is discovered at any state in the process or in the field Supplier will assume responsibility for the costs incurred by Sanmina and/or its customers as a result of the non-conformance. These costs may include but are not limited to:
- Testing, inspection, and sorting as required
 - Process changes which become necessary in order to remedy nonconformity
 - Recall costs
 - Travel incurred
 - Cost of Product(s) or additional Material impacted by the non-conformity
 - Support costs that are directly related to the resolution of the non-conformity
 - Any external analysis
 - Any additional services incurred by Sanmina to the customer
- 8.7. If Sanmina rejects any goods as non-conforming, Sanmina may, at its option, (a) reduce the quantities of goods ordered under this document by the quantity of non-conforming goods, (b) require Supplier to replace the non-conforming goods, and/or (c) exercise any other applicable rights or remedies Sanmina may have.
- 8.8. Sanmina is not obliged to carry out a more detailed examination upon arrival. However, if defects are noticed during the initial examination, Supplier is to be informed of them immediately and Supplier waives any right to reject delayed notification of their deficiencies.
- 8.9. Supplier is required to furnish a Return Material Authorization (“RMA”) for the return of non-conforming Product within 48 hours of the request. For issues requiring correcting action Supplier is required to provide an RMA within 24 hours of the request. Supplier is also required to provide details on the actions of containment within this 24 hour period.
- 8.10. Supplier will bear all risk of loss with respect to all non-conforming Materials and will promptly pay or reimburse all costs incurred by Sanmina to return, store or dispose any non-conforming Materials. Sanmina’s payment for any non-conforming Materials will not constitute acceptance by Supplier, limit or impair Sanmina’s right to exercise any rights or remedies, or relieve Supplier of its responsibilities for the non-conforming Materials.
- 8.11. Material identified as non-conforming Material shall not be reworked and sold to Sanmina as new Material unless prior written authorization has been granted.
- 8.12. Supplier shall perform Failure Analysis on all returned non-conforming Material and when requested shall provide results to Sanmina. Supplier shall collect the data resulting from returned non-conforming Material failure analyses and evaluate trends and recurrences for continuous improvement.

9. Quality Recording Keeping

- 9.1. Supplier will comply with obligations to keep quality records in accordance with the medical, automotive, or general standards as applicable or as mutually agreed upon and in no case less than five year.
- 9.2. Quality records shall be kept and maintained to provide evidence of Product conformance to Supplier’s quality management system.
- 9.3. For Suppliers providing Material used on medical Products, records shall be retained for a period of time equivalent to the design and expected life of the device, but in no case less than fifteen years from the date of release for commercial distribution by the manufacturer.

**10. Environmental Compliance**

- 10.1. All product packing slips shall contain material declaration for products of and for the electrotechnical industry in accordance with IEC 62474:2012 or IPC1752A which shall be attached to the hardcopy as an attachment.
- 10.2. As per J-STD-609B as applicable, all components shall have the outer packaging, carton, boxes and/or inner package material (tray, tube, and reel) marked with traceable information that indicates the compliance aspects, such as the 'No lead, Cadmium, Mercury', etc.
- 10.3. The identification shall also appear on the component itself where there is room for such a marking
- 10.4. As per J-STD-046, revisions to an existing component or material that will result in that part becoming "RoHS" and/or a "lead-free" compliant version shall be documented by advance written notice submitted via email to pcn.eol@sanmina.com.
- 10.5. "RoHS" and/or "lead-free" compliant components must have a unique MPN that distinguishes them from a "non-compliant" (or leaded) version of that component.
- 10.6. All "RoHS" and/or "lead-free" compliant BGA packages, regardless of the date of release, must have a unique MPN that distinguishes them from a "non-compliant" (or leaded) version of that component.
- 10.7. The addition of a prefix or suffix to an existing MPN will be acceptable, and considered an MPN change if the additional characters are required to place orders and receive RoHS-compliant items. (e.g., the additional characters are included in the part nomenclature and must be used to specify "RoHS-compliant" component.)
- 10.8. China RoHS: For products shipped to or within China, and the product and/or packaging materials are deemed to be within scope for China RoHS by the supplier, Sanmina, or one of Sanmina's customers
 - 10.8.1. China's Ministry of Industry and Information Technology ("MIIT") Order No. 32: Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products
 - 10.8.2. Suppliers are required to mark/label the product and/or packaging materials in accordance SJ/T 11364-2014 Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.
 - 10.8.3. Apply hazardous-substance content limits to electrical and electronic products included in the "Compliance Management Catalogue", a list of electrical and electronic products, to be issued in successive batches over the duration of the regulatory program.
- 10.9. Sanmina recognizes that the RoHS Directive (2011/65/EU) allows certain exemptions under Annex III and Annex IV for the use of the restricted substances in particular components and/or specific product applications. It is the supplier's responsibility to ensure that any changes in legally permissible exemptions are assessed and any resulting changes to RoHS compliance are communicated in writing to Sanmina via an updated Sanmina form RoHS-F022 within 45 days of adoption. Sanmina's requirements for RoHS compliance will be revised as legislative requirements evolve.
- 10.10. Sanmina recognizes that REACH Regulation Annex XVII contains the list of hazardous substance restrictions. Each entry provides the substance or group of substances or the mixture, and the consequent restrictions conditions. It is the supplier's responsibility to ensure that any changes in legally permissible uses are assessed and any resulting changes to REACH compliance are communicated in writing to Sanmina via an updated Sanmina form RoHS-F022 within 45 days of adoption. Sanmina's requirements for REACH compliance will be revised as legislative requirements evolve.

11. Counterfeit component avoidance

- 11.1. "Counterfeit Parts" means an item that is not genuine and is an unauthorized copy or substitute that has been identified, marked, or altered by a source other than the item's legal authorized source, and has been misrepresented or disguised to be an authorized item of the legally authorized source.
- 11.2. "Franchised distributor" means a distributor whom a manufacturer has authorized to distribute its product lines as defined in IDEA-STD-1010. Franchised distributors are expected to have contracts with the manufacturer to exclusively provide inventory to the original component manufacturer.
- 11.3. "Independent distributor" means a distributor that purchases excess inventories from end users with the intention to sell and redistribute onto the market that do not have limiting contractual agreements or obligations with the original component manufacturer as defined in IDEA-STD-1010.



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- 11.4. Independent distributors are required to provide verification of authenticity in the form of a certificate of compliance that includes the original manufacturer's name and batch identification for the item(s) such as date codes, lot codes, serializations, or other batch identifications for each item shipped and shall include the following:
- General information as mentioned in Section 4 (Shipping, Packaging, and Labeling Requirements).
 - Applied tests and the results.
 - Shall state "Seller acknowledges its counterfeit risk mitigation obligations pursuant to QAR-0001-C Counterfeit Component Avoidance. It is hereby certified that the goods delivered in this shipment A. only contain Materials obtained directly from the original component manufacturer (OCM) or an authorized distributor and B. are genuine, new, free from defects in workmanship, materials, and design and in accordance with all the requirements of the Purchase Order. C. contain only authentic, unaltered OCM Labels and other markings." or provide test report including evidence of verification of part compliance utilizing methods defined in section 11.04
 - Shall state the part meets the conditions of new as defined in IDEA-STD-1010 or has included an approved deviation to included parts meeting the conditions of unused as defined in IDEA-STD-1010.
- 11.5. Independent distributors shall maintain a counterfeit electronic part detection and avoidance system including risk-based policies and procedures that address, at a minimum, the following areas:
- 11.5.1. Personnel training. Preference for inspectors to be certified to IDEA-ICE-3000 or CCCI-102.
- 11.5.2. The inspection and testing of electronic parts, including criteria for acceptance and rejection. Tests shall be performed in accordance with AS6171 and inspections shall be performed per IDEA-STD-1010. Selection of tests and inspections shall be based on minimizing risk to the Sanmina. Determination of risk shall be based on the assessed probability of receiving a counterfeit electronic part; the probability that the inspection or test selected will detect a counterfeit electronic part; and the potential negative consequences of a counterfeit electronic part being installed (e.g., human safety, product impact).
- 11.5.3. Processes to abolish counterfeit parts proliferation including quarantining and disposal of counterfeit material.
- 11.5.4. Processes that enable establishing a chain of custody for the electronic parts from the OCM to the independent distributor. If the independent distributor cannot establish the chain of custody from the OCM for a specific part then apply a risk-based inspection or testing, to authenticate the electronic part, in accordance with existing applicable industry standards, and maintain documentation of the chain of custody, or inspection and testing applied to authenticate the part when traceability cannot be established and make such documentation available to the Sanmina upon request.
- 11.5.5. Supplier shall immediately notify Sanmina at quality.portal+counterfeit@sanmina.com and the buyer on the purchase order with the pertinent facts if Supplier becomes aware of or suspects that items delivered for the Purchase Order are, or contain, suspect or confirmed counterfeit items. This includes but is not limited to the affect purchase orders numbers, all information on purchase order that identifies the affected good including the original component manufacture, part number and lot code and the evidence of suspected counterfeit.
- 11.5.6. Supplier and supplier's subcontractors that are allowed access to the US Government Industry Data Exchange Program (GIDEP) shall participate in monitoring GIDEP reports and Supplier shall act on GIDEP reports that affect product delivered to Sanmina.
- 11.5.7. The Supplier and/or the supplier's subcontractors shall cooperate in good faith with any investigation conducted by Sanmina. Sanmina shall not be required to return the good during the investigation process and thereafter if not found to be authentic. Sanmina shall not be liable for payment to Supplier of the price of any Suspect Counterfeit Items until determined to be authentic. If Sanmina determines in its sole discretion that there is credible evidence that a good delivered under this Purchase Order constitutes a Counterfeit Item or Suspect Counterfeit Item, Supplier, or its subcontractor, shall, if directed by Sanmina to do so, issue a GIDEP alert. Sanmina reserves its right to issue its own GIDEP alert if Buyer concludes, in its sole estimation, that a good is a Counterfeit Item or Suspect Counterfeit Item. Sanmina recommends that suspect counterfeit parts also be reported to ERAI.
- 11.6. There shall be an effective system for the legal disposition of counterfeit components and control of non-conforming product.



- 11.7. Independent distributors shall perform a visual inspection of the component pursuant to the inspection criteria provided for in IDEA-STD-1010.
- 11.8. Sanmina reserves the right to exercise its anti-counterfeit processes and procedures for both suspect counterfeit parts and actual counterfeit parts provided to it by Supplier and includes, but is not limited to quarantine, disposal or another form of disposition of the counterfeit components and/or parts.

12. Conflict minerals avoidance

- 12.1. Supplier shall comply with Sanmina's Conflict Minerals Specifications and Requirements as set out in Sanmina's [Supplier Conflict Minerals Requirements](#) document.
- Conduct appropriate conflict minerals due diligence within your supply chain, using the OECD Conflict Minerals Due Diligence Guidelines as a framework.
 - Identify and take actions to mitigate any risks identified as part of this due diligence.
 - Report the results of your due diligence to Sanmina using the EICC/GeSI Conflict Minerals reporting template as requested by Sanmina.
 - Provide an updated template if there are any material changes to the results of your due diligence.

13. Soldering Temperature

- 13.1. As per J-STD-020 all components shall be able to withstand the temperatures stated in the most current version of the document. This document only covers active components - it does not address PCBs.

Table 1: Device Peak Reflow Temperature for Eutectic Tin-Lead Soldering		
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥ 350
<2.5 mm	235°C	220°C
≥ 2.5 mm	220°C	220°C

Table 2: Device Peak Re-flow Temperature for Lead Free Soldering			
Package Thickness	Volume mm ³ < 350	Volume mm ³ 350 - 2000	Volume mm ³ > 2000
< 1.6 mm	260°C	260°C	260°C
1.6 mm - 2.5 mm	260°C	250°C	245°C
> 2.5 mm	250°C	245°C	245°C

- 13.2. PCB laminate material:
- 13.2.1. Shall have thermal properties compliant to the high temperature, at least 260°C, requirements of lead free soldering. Such PCB laminate materials include, but are not limited to, Polyclad 370HR Phenolic based or Phenolic cured, TUC TU722-7, Matsushita 1755, Nelco 4000-11, and Isola 410, Aromatic Phenolic Cured Novolac Type (No_Dicyandiamide).
- 13.2.2. Shall have superior delamination resistance as specified by Time to Delaminate (T_d) index with a minimum T_g of 160°C.
- 13.2.3. Shall pass UL Laminate Material test T-260 for 25 minutes at a minimum temperature of 260°C.
- 13.3. The soldermask material shall be lead free soldering compliant. Such soldermask materials include, but are not limited to, Enthone DSR 3241 CRI which is considered Lead Free compatible.
- 13.4. For PCBs with OSP coating, the OSP material shall be lead free compliant. Such materials include, but are not limited to, Entek 106AX-HT type.
- 13.5. Wave soldered components shall be capable of surviving one pass through 260°C solder bath for 5 seconds. Solderability compliance shall be in accordance with J-STD-002.

**14. Compatibility with Pb-Free Rework**

- 14.1. Unless otherwise specified by the device manufacturer, a Pb-free component (classified per Table 4.2 of J-STD-033), shall be capable of being reworked at 260°C within 8 hours of removal from dry storage or bake, per J-STD-033.
- 14.1.1. To verify this capability for a component classified at a temperature below 260°C, a sample of the size per clause 5.1.2 of J-STD-033 shall be soaked per Level 6 conditions (see Table 5-1 of J-STD-020) using a time on label (TOL) of 8 hours, and reflowed at a peak temperature of 260°C.
- 14.1.2. All devices in the sample shall pass electrical test and have a damage response per 6.1 and 6.2 of J-STD-033 not greater than that observed for the same package at its rated MSL level. A component rated at 260 °C does not require this rework compatibility verification.

15. Component termination finishes

- 15.1. The following component termination or plating finishes are considered acceptable as they exhibit low propensity to Sn whisker growth for components as long as the specified processing conditions and compositions are met.
- 15.1.1. Non-Tin Plating:
- Sn-Ag-Cu solder coated or plated termination finishes are acceptable.
 - Ni/Pd/Au is the preferred system for component termination finish. This plating is considered less prone to whisker growth and offer acceptable wetting during reflow.
 - Gold lead finish is acceptable, with the provision that the amount of gold on the termination is accurately quantified. The concentration of gold in solder joints shall not exceed 3% by weight.
 - Gold lead finishes are not allowed for use as a sliding contact with a mating tin-plated connector, due to the possibility of fretting corrosion.
- 15.1.2. Tin-based Plating
- Cu/Ni/Matte Sn termination finish is acceptable as long as the Ni plating thickness is more than 1.3 µm (microns) and the Sn thickness is > 8.0 µm. Sn may be either pure Sn or Sn with 1-3wt. % Bi.
 - Matte Sn-Ag component finishes are generally acceptable as long as proper plating procedures are followed.
- 15.1.3. Solder dipped terminations for components > 1.27 mm pitch acceptable. Solder may be Sn or Sn (3-4wt. %) Ag 0.1wt. %Cu.

NOTE: Matte Sn is defined as having a grain size greater than or equal to 2 µm, a carbon content less than or equal to 0.05%, and a copper content of less than 0.5%.

16. Other termination options

- 16.1. The following termination finish options have a high risk of Sn whisker growth and potential adverse effect on solder joint reliability. Sanmina does not consider these termination finish options to be optimal. As a result, special consideration must be taken before these termination finishes are used. Suppliers must request and obtain written approval from SANM ordering location(s) before providing parts with the following termination finishes. Such requests will be made at least ninety (90) days in advance of the supplier's projected first ship date.
- 16.1.1. Tin Plating Directly on Cu: In situations where tin is directly plated on Cu, in order to minimize the potential for whisker growth, the following steps must be followed.
- The Cu must be annealed for 60 minutes at 150°C.
 - Plating shall take place in less than 24 hours after the annealing.
 - Sn thickness should be at least 10 µm.



- 16.2. The following are unacceptable termination finishes and shall not be used on parts provided to SANM
- 16.2.1. Bright tin over any base metal
 - 16.2.2. Tin-copper alloy over any base metal
 - 16.2.3. The eutectic Sn-Cu binary alloy which has a eutectic composition of Sn0.7wt. % Cu and eutectic temperature of 227°C. The solidification reactions consist of Cu precipitated in the form of hexagonal hollow rods of Cu₆Sn₅ intermetallic compound. Data that describes the characteristics of this alloy is limited. However, because of the high concentration of tin in this solder alloy, it may be prone to whisker growth and transformation to gray tin may occur. The effect of the presence of Cu in Sn-Cu system to the growth of Sn whiskers or β-tin to α-tin transformation is not clear at this time.
 - 16.2.4. Tin plated over copper that has not undergone heat treatment.
 - 16.2.5. Alloys of silver/palladium.
 - 16.2.6. Tin-bismuth alloy for through-hole components and Tin-bismuth alloys for components which may exceed 138°C in use environment. Sn-Bi alloy has a eutectic composition of 42wt. %Sn-58wt. %Bi and a relatively low eutectic temperature of 139°C. The room temperature equilibrium phases are Bi and Sn with about 4 wt. % Bi in solid solution. Since tin has low solid solubility in Bi, the Bi phase is essentially pure Bi. However, the maximum solubility of Bi in Sn is about 21 wt. %. As the alloy cools, Bi precipitates in the Sn phase. At moderate cooling rates, the eutectic Bi-Sn microstructure is lamellar, with degenerate material at the boundaries of the eutectic grains. It has been reported that re-crystallization of the alloy produced an expansion of up to 0.0007 in/in. This expansion may result in embrittlement, which may be due to strain hardening caused by deformation that occurs to accommodate the expansion.

17. Testing for whiskers

- 17.1. The supplier shall maintain on file and provide to Sanmina upon request the test procedures and standards used and/or followed, and results to ensure whisker-free coating on component terminations.
- 17.2. Sanmina endorses and accepts the international National Electronics Manufacturer's Institute (iNEMI) User Group Tin Whisker Acceptance Test Requirements and Guidelines.
- 17.3. In principle Sanmina does not accept whiskers of any kind. However, in specific circumstances and with the consent and approval of the end user or customer, whiskers less than 10 μm in length may be acceptable on incoming components expected to undergo soldering processes. Suppliers must request and obtain written approval from Sanmina ordering location(s) before providing such product/parts. Such requests will be made at least ninety (90) days in advance of the supplier's projected first ship date.

18. Part qualification

- 18.1. Components and/or assemblies shall be provided along with a qualification package. The following industry standards and procedures shall apply as applicable.
 - 18.1.1. Methods and conditions as specified in AESD-A113; Qualification Standards.
 - 18.1.2. Handling, Packing, Shipping and Use per IPC J-STD-033.
 - 18.1.3. Solderability testing per J-STD-002 with no-clean and aqueous clean solder paste and wave solder flux included. The solderability qualification data must include Solder alloy used, termination metallurgy and thickness.
 - 18.1.4. Solder joint reliability testing per IPC 9701A.
 - 18.1.5. Mechanical shock & vibration per AEC-Q100 - Rev E; Mil-Std 833.
 - 18.1.6. High temperature storage per AEC-Q100-Rev H/JESD22-A103-E.
 - 18.1.7. Tin whisker growth data and the testing method used.
 - 18.1.8. Moisture sensitivity level per J-STD-020 with the following exceptions:
 - Component peak temperature ratings shall be at least 260°C per J-STD-020.
 - Six heat cycles for area array packages and four heat cycles for other components shall be included in pre-conditioning. (The six heat cycle requirements to account for the potential maximum heat cycle an area array package may be exposed in manufacturing. Included are two reflows, wave soldering, component removal, re-balling, and re-attachment).



18.1.9. Component moisture sensitivity levels shall not exceed the current levels for non-RoHS-compliant parts. Wherever possible, testing shall include old vs. new part comparisons.

18.1.10. Identify forward and backward compatibility of product as applicable.

19. Sheet metal and enclosure coatings on steel and aluminum

19.1. Chromium (III) conversion coatings such as zinc hot dip are acceptable and preferred options to replace Hexavalent Chromium conversion coatings commonly used on steel components and hardware.

19.2. Electroplate using an acid zinc bath, according to ASTM B-633 SCI Type III, with clear trivalent chromate conversion coating, blue, bright is an acceptable replacement option for Hexavalent Chromium provided that the coatings withstand a minimum of 96-hour salt spray, as defined in ASTM B-166 with no additional dips or coatings. Alkaline electroplated zinc is not allowed due to zinc whiskers. Surface resistivity shall be a maximum of 0.1 ohms per square.

20. Product data sheets

20.1. Data sheets or declaration forms must clearly indicate the following and shall be provided to Sanmina upon request. Such data sheets and declaration shall be retained for a minimum of 5 years from the date of last product shipment.

20.1.1. Termination Solder Composition

20.1.2. Maximum Component Temperature Rating

20.1.3. Recommended Reflow Profile Limit

20.1.4. Absolute Reflow Profile Limit

20.1.5. Moisture Sensitivity Level (MSL) Rating

20.1.6. Material Composition: Complete composition of component

20.1.7. Material Composition: In the event proprietary compositions exist, they shall be identified as "proprietary - miscellaneous"

20.1.8. Material Declaration in compliance with IPC-1752B.

**Addendum A****Automotive Addendum to the Supplier Quality Requirements
For Purchased Materials or Services Document**

A-1.0 Scope: The following requirements are for Suppliers that are supplying Materials or Services intended for use in automotive product. This addendum supersedes any requirements called out in the general document which may be in conflict.

A-2.0 Automotive Requirements:

- A-2.01 Supplier shall at a minimum, be certified to ISO 9001 and have a willingness to develop a system in compliance to IATF 16949 and all sanctioned interpretations. Supplier shall have a process in place to check latest IATF 16949 Sanctioned Interpretations document for its adoption (if applicable).
- A-2.02 Unless otherwise agreed upon in advance, Supplier shall be in compliance and have processes that are compliant to the following:
- Advanced product Quality Planning - ("APQP") (AIAG / QS 9000 / VDA 4.3)
 - Production Part Approval Process - ("PPAP") (AIAG Manual / VDA 2) - or as requested by Sanmina
 - International Material Data System - ("IMDS")
 - Quality Management Planning
 - Management System Audit (QS 9000, IATF 16949)
 - Automotive Industry Action Group - ("AIAG") - AIAG Manuals
 - Zero Defect Approach
 - Applicable standards including but not limited to JEDEC, IPC, ANSI, and SAE.
- A-2.03 Packaging instructions shall be included in the PPAP.
- A-2.04 The supplier shall add a certificate of conformance to each shipment which shall include in minimum the following items:
- General information as mentioned in section 5.08
 - Information that the material is still in accordance with the data sheet and the latest version of the PPAP.
- A-2.05 Machine and Process capabilities should be minimum $CmK \geq 2.0$ / $Cpk \geq 2.0$ / $Ppk \geq 1.67$. If lower, it is expected that Supplier will put additional inspections in place.
- A-2.06 Supplier shall maintain and make available upon request outgoing quality inspection, reliability records, and applicable data as defined within this document for a minimum of fifteen (15) years after product shipment.
- A-2.07 The corrective action timeframe shall be in accordance with corrective actions and shall be considered "urgent" as referenced in Table 1 in [JESD671](#) latest revision or as otherwise reasonably requested by Sanmina.
- A-2.08 Supplier will bear all risk of loss and costs with respect to all non-conforming Materials and will promptly pay or reimburse all costs incurred by Sanmina to return, store, or dispose any non-conforming materials. Sanmina's payment for any non-conforming Materials will not constitute acceptance by Sanmina, nor shall acceptance limit or impair Sanmina's right to exercise any rights or remedies, or relieve Supplier of its responsibilities for the non-conforming Materials.
- A-2.09 Suppliers shall provide and maintain a quality improvement plan on a quarterly basis or as otherwise requested by Sanmina.
- A-2.10 Targeted PPM values aimed at achieving the zero defect strategy may be communicated to Supplier. It is intended that Supplier will strive to attain these set targets communicated to Supplier by Sanmina. Failure to meet set targets will require a formal corrective action plan.
- A-2.11 Supplier shall implement and maintain a process for software quality assurance for product-related software, or products with embedded software.
- A-2.12 Supplier shall document and retain software development capability self-assessment information.
- A-2.13 Supplier shall have a control plan in accordance with IATF-16949 Appenx A.1 for each part number or part families produced using a common process.

**Addendum B*****Medical Division Addendum to the Supplier Quality Requirements
for Purchased Materials or Services***

B-1.0 Scope: The following requirements are for Suppliers that are supplying Materials or Services intended for use in medical product. This addendum supersedes any requirements called out in the general document which may be in conflict.

B-2.0 Medical Requirements: In order for Sanmina to furnish devices that are safe, effective and in compliance with the Federal Food, Drug and Cosmetic Act.

B-2.01 In compliance with FDA Regulations 21 CFR Part 820.50, Purchasing Controls, Supplier shall comply with section 6.0 in the general document.

- At a minimum, change notification information shall consist of change description, proposed change date, affected part number(s), contact information, reason for change and method of identification.
- Associated records shall be maintained for a minimum of 15 years.

B-2.02 In compliance with FDA Regulations 21 CFR Part 820.60, Identification, Supplier shall comply with section 3.0 in the general document.

B-2.03 In compliance with FDA Regulations 21 CFR Part 820.65, Traceability, Supplier shall comply with 5.7 and 4.6.

- Each package of material furnished shall contain Material with the same lot or date code and purchase order unless prior written authorization has been granted. In these cases Sanmina will communicate and document the mutual agreement of said requirements utilizing Sanmina form QAF-0069-C.

B-3.0 Compliance Failures:

B-3.1 Failure to comply with the above Medical requirements renders the resulting devices “adulterated” and subject (along with the responsible party) to regulatory action.

**Addendum C*****Oil and Gas Addendum to the Supplier Quality Requirements
For Purchased Materials or Services Document***

C-1.0 Scope: The following requirements are for Suppliers that are supplying Materials or Services intended for use in oil and gas product. This addendum supersedes any requirements called out in the general document which may be in conflict.

C-2.0 Oil and Gas Requirements:

- C-2.01 The supplier shall provide a certificate of conformance (COC) for each line of each shipment which shall include in the following information:
- Purchase Order Number and Line
 - Manufacturers Part Number
 - Part Description
 - Revision
 - Serial Number(s) (If Applicable)
 - Lot code and Date code as applicable
 - General information as mentioned in section 5.08
 - Heat Code (if Applicable)
 - Lot / Batch Code Information (if Applicable)
 - Signature of the person in charge for this COC or statement, that this document is generated automatically and valid without signature.
- C-2.02 When defined by purchase order, drawing, Sanmina standards or Sanmina's customer standards, the supplier shall provide with each delivery:
- A legible copy of the material certification/test report, which identifies the producer/manufacturer of the material furnished, shall accompany each shipment. The certification shall include the heat number, heat lot number or melt code which shall be traceable to the raw material manufacturer.
 - Special Process Certification: A legible copy of the certification for special processes shall accompany each shipment. Special Processes include but are not limited to, welding, heat treating, radiographic inspection, magnetic particle inspection, penetrant inspection, ultrasonic inspection, brazing, soldering, coating and plating. The certification shall list the applicable specification, including revision letter/number to which the process conforms. This includes the type or class, date, P.O. number, part number and quantity.
 - Functional Test Reports: A legible copy of the actual test reports, identifiable with test parameters and items submitted shall accompany each shipment.
- C-2.03 **Contract Review:** Sanmina communicates requirement to the supplier through a purchase order containing an item number, revision, and special notes. The supplier shall confirm that their process is aligned with both the item number and revision level being ordered. If a discrepancy is identified, the supplier shall contact their assigned Sanmina purchasing representative for resolution and direction.
- C-2.04 **Special Processes/Processes Requiring Validation:** Special processes such as welding, non-destructive examination (NDE), and heat treat must be performed in accordance with strict process control measures as well as industry and Sanmina customer standards.
- Standards from the following organizations contain examples of such process control measures (list is not all-inclusive): American Welding Society (AWS), American Society of Mechanical Engineers (ASME), American Society for Non Destructive Testing (ASNT), American Petroleum Institute (API), International Standards for Organization (ISO), Military Specifications
 - Processes Requiring Validation: Some processes preclude verifying the resulting output. As a consequence, deficiencies in those processes only become apparent after the product is delivered and placed in service. It is the responsibility of the supplier to address methods to validate those processes during their manufacturing or when outsourcing to sub-tier suppliers.

