Supplier Quality Requirements

Document 10139520-244

Table of Contents

1 PURPOSE

2 SCOPE

3 ORDER OF PRECEDENCE

4 ABBREVIATIONS / DEFINITIONS

5 REFERENCES

6 ENVIRONMENTAL LAWS AND REGULATION COMPLIANCE

7 REGULATORY AGENCY COMPLIANCE

8 NOTIFICATION OF PRODUCT NON-CONFORMANCE OR DELIVERY ISSUE

9 SUPPLIER PRODUCT / PROCESS CHANGE NOTIFICATIONS (PCN, also known as SPCN)

10 QUALITY SYSTEM REQUIREMENTS

11 PRODUCT NON-CONFORMANCE RESOLUTION

12 LUMENTUM PARTS APPROVAL PROCESS REQUIREMENTS (LPAP)

13 ONGOING RELIABILITY MONITORING OR TESTING (ORM or ORT)

14 CONFIGURATION CONTROL

15 RECORDS RETENTION

16 HANDLING, PACKAGING, LABELING, STORAGE & SHIPPING

17 PROCESS CAPABILITY (Cpk) REPORT AND EXPECTATIONS

18 PROCESS YIELDS

19 SHIPMENT DATA PACKAGE REQUIRMENTS

20 FAI (FIRST ARTICLE INSPECTION)

21 TOOL LIFE CONTROL

APPENDIX A: Supplementary Supplier Quality Requirement for Commodity Component or Sub-Assembly Suppliers for Lumentum

EXHIBIT 1: FORM 10139523-011 (SUPPLIER TO REQUEST LATEST REVISION)
EXHIBIT 2: FORM 10139523-045 (SUPPLIER TO REQUEST LATEST REVISION)
EXHIBIT 3: FORM 10139523-268 (SUPPLIER TO REQUEST LATEST REVISION)

Last Page is the ACKNOWLEDGEMENT FORM (to be filled in and returned)

1. PURPOSE

This Procedure entitled "Quality Requirement for Suppliers" defines the quality requirements for all Lumentum suppliers within the scope below. Terms incorporated into this Procedure by reference are available at https://www.lumentum.com/terms.

2. SCOPE

This Procedure applies to Suppliers who manufacture/supply any parts/products/service for use in Lumentum finished goods and products, and in the tools and fixtures used for Lumentum production. It applies whether those parts/products are Lumentum designed or not. It applies whether those parts/products are shipped directly to Lumentum or indirectly to Lumentum through the outsourced contract manufacturers that produce Lumentum finished goods and products.

3. ORDER OF PRECEDENCE

The order of precedence shall be defined under the agreement between the parties.

4. ABBREVIATIONS / DEFINITIONS

4.1 **8D:** 8 Disciplines as follows: D1: team formation, D2: problem description, D3: interim containment actions, D4: root cause analysis, D5: corrective actions, D6: validate corrective actions, D7: identify and implement preventive actions, D8: team and individual recognition.

4.2 **Certificate of Compliance or Conformance (C of C):** Document certifying that supplied products meet the required specifications.

4.3 **Closed-Loop Corrective Action (CLCA):** The pattern of activities which traces the symptoms of a problem to its cause, produces solutions for preventing the recurrence of the problem, implements the changes and monitors that the changes have been successful.

4.4 **Early Life Failure Rate (ELFR):** Calculation based on performance measurements made to compare reliability performance with objectives, provide line feedback, support service cost estimates, and set product test and screen strategies to meet customers' requirements.

4.5 **Contract Manufacturer Incoming Quality Assurance (CM IQA):** CM employees located in contract manufacturer sites performing inspection of incoming parts on behalf of Lumentum.

4.6 **ISO-9001:** the criteria for a quality management system as set out by the International Organization for Standardization.

4.7 **Sourcing Manager (SM):** Lumentum employees in Global Supply Chain Department for commercial purposes including supplier pricing negotiations and allocation decisions.

4.8 **Supplier Quality Engineer (SQE):** Lumentum employees supporting contract manufacturer sites interfacing with Supplier.

4.9 **Major Change:** Any change to parts/products within Scope that could adversely affect (unintentionally or otherwise) one or more of the six following: form, fit, function, quality, reliability, performance, process control parameters (example time/force etc.), part number change, product discontinuance, (including but not limited to changes in mfg. process, packaging, mfg. location, testing, inspection, dimensions, tolerances, sub-suppliers, materials, storage, shipping, environment, safety, etc.). Notification must be sent to PCN@Lumentum.com as soon as Suppliers have intentions to makes major changes and/or have internally received notification of such intentions from Suppliers' suppliers.

4.10 **Mean Time Between Failures (MTBF):** The predicted elapsed time between inherent failures of a system during operation.

4.11 **Minor Change:** Any change that does not fall within the definition of a Major change. Examples include a change in documentation only (e.g. corrections, clarifications).

4.12 **NCMR:** Non-Conformance Material Report: A standard way to report non-conforming material that is identified during inspection of items or material.

4.13 **Precision to Tolerance Ratio (P/T):** The ratio of the precision of a measurement system to the (total) tolerance of the manufacturing process of which it is a part.

4.14 **Process Failure Modes and Effects Analysis (PFMEA):** Systematic, proactive method for evaluating a process to identify where and how it might fail and to assess the relative impact of different failures, in order to identify the steps or aspects of the process that are most in need of change.

4.15 **Product/Process Change Notice (PCN also known as SPCN):** Document from Supplier in advance of a change that describes the pending change sufficient to enable Lumentum and its customers to evaluate and prepare (or reject) accordingly. Includes discontinuation notices (PDN also known as SPDN). Required for major changes as defined above.

4.16 **Reduction of Hazardous Substances (RoHS):** European Union Directive 2015/863 published 31 March 2015 includes 10 hazardous substances that manufacturers must eliminate from use in their electronic products in order to legally sell in jurisdictions around the world.

4.17 **Risk Priority Number (RPN):** A number to quantify the relative impact of different possible failures by quantifying and then multiplying the known or estimated severity x occurrence x detection difficulty.

4.18 **Supplier Corrective Action Request (SCAR):** Means the request to Supplier and record thereafter capturing Supplier problem-solving as per 8D and CLCA methods noted above.

4.19 **Technology, Quality, Responsiveness, Delivery, Cost Performance, and Social Responsibility (TQRDS):** Supplier evaluation model used by Lumentum as a tool in selecting suppliers and setting allocation.

4.20 **TL9000:** A derivative of ISO-9001 focused on supply chain directives in the international telecommunications industry.

4.21 **Deviation Request Form:** Refer to the attached EXHIBIT 1.

4.22 **Lot Acceptance Test (LAT):** Also called Outgoing Quality Control (OQC). Testing/Measuring defined parameters to ensure conformance to the specifications for each quantity of product accumulated under conditions that are considered uniform. The intent of this requirement is to verify by statistical random sampling that a manufactured lot that has been released for shipment to the customer meets the customers' requirements as identified by CTF/CTF requirements. This test to be conducted by an independent group, such as quality, to confirm acceptance. All sample rules must apply per Standards defined (e.g., ANSI/ASQC Z1.4). Note, for any in-process testing or measurement of variable data if the process is not stable and/or not capable (Cpk < 1.33), 100% inspection is required. For any in-process cosmetic inspection 100% inspection is required per customer's documented cosmetic requirements.

4.23 **First Article Inspection (FAI):** Test and Measurements data for all parameters (except reference) and all notes documented in the drawing, design specifications, purchase order requirements.

4.24 **Supplier:** Entity that provides components, material, and services to Lumentum or to Lumentum contract manufacturers.

4.25 **Sub-Suppliers:** Outsourced or external entity that provides process steps and/or raw materials and/or sub-assemblies to the Supplier.

4.26 **Process Capability (Cpk):** Process capability indices Cp and Cpk evaluate the output of a process in comparison to the specification limits determined by the target value and the tolerance range.

5. REFERENCES

5.1 10139520-280 – Lumentum Parts Approval Process for Suppliers

6. ENVIRONMENTAL LAWS AND REGULATION COMPLIANCE

Supplier, and the parts within the scope above, shall comply with all legal regulations, ordinances, decrees, orders, laws, and other rules and regulations, including without limitation the EICC Code of Conduct and all rules, regulations and provisions relevant to health, safety, human rights, labor, ethics, and the environment (including without limitation the restrictions on materials set forth in the EU Council Directives 2011/65/EC (RoHS) and other country-specific RoHS requirements, and the restriction and notification of substances set forth in EU Regulation EC 1907/2006 (REACH) and the procurement of minerals from areas of conflict. Supplier shall cooperate fully with Lumentum's efforts to demonstrate compliance including providing Lumentum with a written declaration of compliance upon Lumentum's request. Supplier shall also provide Lumentum with a full material declaration upon Lumentum's request and shall advise Lumentum if the chemical content changes in the parts being sold to Lumentum. Any service required to achieve compliance hereunder shall be included in the price of the parts.

7. REGULATORY AGENCY COMPLIANCE

See section **6**.

8. NOTIFICATION OF PRODUCT NON-CONFORMANCE OR DELIVERY ISSUE

Supplier shall be responsible for ensuring that all requirements are met before the product is shipped. Requirements include but are not limited to those defined by Lumentum specifications; industry standards; claims stated in Supplier's published product advertising, catalogues, data sheets, material expiration dates and regulatory agencies.

If a non-conforming condition exists with their products before shipment, Lumentum expects Supplier to discover it through diligence before shipment and notify the Lumentum buyer, Supplier Quality Engineer, or Supply Chain Management in writing immediately. If Supplier has reasons to believe that Lumentum can use the products despite non-conforming condition, Supplier shall submit a Deviation Request Form to Lumentum prior to shipment and await Lumentum's written approval (refer to the attached EXHIBIT 1). If parts are not going to be accepted by Lumentum, Supplier shall instead create a recovery plan and submit to Lumentum. Under no circumstances may Supplier ship the non-conforming products without an approved deviation from Lumentum included in the shipment.

If Supplier discovers a non-conforming condition with their products after shipment, supplier shall notify Lumentum in writing immediately. The notification must include at least the following applicable information: 1) description of the non-conforming condition, 2) part numbers affected, 3) lot numbers involved, 4) serial numbers involved, and 5) date codes involved. Supplier to include any other information that can help to identify the scope of the issue, such as PO number, ship date, and tracking number.

If supplier non-conforming product has been identified at Lumentum or Lumentum CM and has been confirmed through the NCMR process, the supplier is responsible for providing an RMA number within 5 working days for Product Non-Conformance resolution. Reference Section **8**. Inspection per TERMS OF PURCHASE https://www.lumentum.com/en/terms-and-conditions.

9. SUPPLIER PRODUCT / PROCESS CHANGE NOTIFICATIONS (PCN, also known as SPCN)

Overview:

- Document expected from Supplier in advance of a major change.
- Document describes the pending change sufficient to enable Lumentum and its customers to evaluate and prepare (or reject) accordingly.
- Document includes discontinuation notices (PDN also known as SPDN).

Inclusions:

- See Major Changes under Definitions
- Any change to product, material, process or manufacturing location or manufacturing line of the supplier and its sub-contractors that affects one or more of the following: form, fit, function, major process, quality, reliability or performance.

Specific Inclusions:

- Any change of dimensions of the product.
- Any relaxation of the tolerances of the product's dimensions.
- Any change of materials used by the supplier in the manufacturing of the part.
- Any change of materials used by the supplier in the part itself.
- Any change in process control parameters including time, temperature, humidity, pressure and environment.
- Any increase in storage severity.
- Any relaxation of the inspection and testing performed on the product.
- Any relaxation of the product identification or packaging.
- Any change of packaging that could conceivably increase the risk of damage during handling, shipping and storage.
- Any changes in part number.
- Any change in selection of site where product is manufactured or manufacturing line.
- Any change in selection of sub-contractors used by the supplier to manufacture the part.
- Product discontinuance

Specific Exclusions:

- Change has zero effect on any of the following: form, fit, function, major process, quality, reliability or performance.

Timing:

- Supplier shall send PCN to PCN@Lumentum.com 180 days before the proposed first ship date of the product identified in the PCN, because Lumentum's customers need time to evaluate and may request Lumentum samples made with the proposed changes to evaluate. If the change request is made before 180 day, the supplier is responsible for mitigating potential gaps in pre change material, components, and/or services. This timing requirement may not be applicable for change requested by Lumentum.

- In cases where Supplier is presented with a change notification from Suppliers' supplier, Notification must be sent to PCN@Lumentum.com as soon as Suppliers have intentions to makes major changes and/or have internally received notification of such intentions from Suppliers' suppliers.
- Lumentum may request sample parts before the proposed first ship date of the released product as necessary.

Logistics

- On request from Lumentum, enter and submit the notification details in Lumentum's PCN/SPCN template (EXHIBIT 2, form number 10139523-045).
- On request from Lumentum, perform qualification tests deemed necessary to Lumentum.
- Submit reports on performed/passed qualification tests.
- DO NOT implement any proposed changes for shipping products until Lumentum provides advanced written approval.
- If a requalification is required, supplier's samples shall be delivered to Lumentum or as otherwise mutually agreed.
- Lumentum shall specify the required sample size.
- If applicable, implemented supplier process/product changes shall identify the increment revision tracking digits within the product label as defined by Lumentum.

Supplier Non-Compliance:

- Failure to follow this process can result in any or all of the following consequences that would ultimately affect Suppliers' performance ratings:
  - Issuance of a Lumentum SCAR
  - Possible cancellation of existing purchase orders
  - Potential loss of future business
  - Removal from preferred supplier list
  - Removal from approved supplier list

10. QUALITY SYSTEM REQUIREMENTS

Supplier shall be required to have an effective quality system in place that assures consistent on-time delivery of conforming products. Supplier shall be certified to ISO-9001 or have an equivalent quality system, discussed with and approved by Lumentum, including an established program to make the necessary modifications to meet the latest release of the standard prior to the required date. TL9000 and other certifications are required for the production of specific products. The supplier shall inform Lumentum of any negative changes in the status of their ISO or TL9000 certifications and should allow review of the external audit reports and corrective actions at the request of Lumentum.

11. PRODUCT NON-CONFORMANCE RESOLUTION

11.1 Expectations

Lumentum expects suppliers to use an 8D approach when responding to root cause analysis and corrective actions. Each of the sections of this response should be accompanied by dates for their

completion and actions that need to be clearly spelled out so that they can be tracked and updated. It is expected that the problem description and any containment actions will be completed within 48 hours of a request from Lumentum.

This necessitates that suppliers provide clear problem statements which are data driven and contain factual information about the where, when, and what of the particular issue. Containment actions should have details about the affected product (serial numbers, lot numbers, etc.), how the issue affects related products, short term actions to contain the affected products, and a risk analysis based on all of the known information to date.

Root cause analysis is expected to be based on the analysis of the facts using tools such as cause and effect diagrams, FMEAs, etc. Data analysis needs to be provided to prove the root cause. Corrective actions need plans and are expected to be validated by data. Preventative actions should be focused on how the issue will not reoccur on the affected product and any future products provided to Lumentum. Preventative actions need to address systemic process issues; training an operator is not a preventative action.

11.1.1 8D Problem Solving Process

11.1.1.1 D1: Create the Team

Select and establish a team of people with product/process knowledge.

11.1.1.2 D2: Describe the problem

Specify the problem by identifying in quantifiable terms the who, what, where, when, why, how, and how many for the problem.

11.1.1.3 D3: Define containment actions

Define and implement containment actions to isolate the problem from any customer. Is there a risk that shipped product in the field will also suffer the failure? What else needs to be contained or retested before the root cause is understood and fixed? Does this issue affect similar products sold to Lumentum?

11.1.1.4 D4: Analyze the root cause

Root cause analysis requires not only data but analysis of the possible causes of the failure. Tools for this are cause and effect diagrams (Ishikawa), FMEA, or tables of changes and variations. For data analysis, it is expected that root causes be substantiated with trends from graphed data, Pareto Analysis, box-plots, etc. Supplier will need to answer 1) Why the non-conformance was made this way, and 2) Why it was shipped this way.

11.1.1.5 D5: Define possible corrective actions

Corrective actions need specific actions with dates and owners. Quantitatively confirm that the selected correction will resolve the problem. It is expected that these will be clearly spelled out and that updates will be provided accordingly. Some corrective actions are elimination of the issue, mitigation, screening, etc.
D6: Implement corrective actions

Implementation needs to be validated. What is being measured in order to validate the corrective action? What data will be provided and how will be used in order to show that the corrective actions were successful?

11.1.1.6 D7: Define actions to avoid recurrence

Preventative actions should be focused on how the issue will not reoccur on the affected, related, of future products. The actions need to address systemic process issues.

11.2 Minimum Requirements

Suppliers shall use the 8D approach to resolve all problem issues including failure to meet quality goals as defined by Lumentum, customer returns and other situations as deemed necessary by Lumentum. All issues must be documented in the 8D format including initial verification and disposition. Timelines outlined in Section **11.4** must be adhered to.

11.3 Supplier Corrective Action Request (SCAR)

Lumentum reserves the right to issue a SCAR to suppliers for any discovered non-conformity or complaint. The SCAR shall be numbered and issued in writing and its receipt must be acknowledged by suppliers upon receipt of the SCAR as described below under Section **11.4**. Supplier shall be responsible to take containment actions as deemed necessary to fix any cited non-conformities in the SCAR. These containment actions and the final corrective action plans in 8D or equivalent format shall be provided to Lumentum as described under Section **11.4**.

For major corrective or preventative action changes a Supplier PCN is required.

11.4 Timelines

Unless otherwise specified by Lumentum, the timeline for SCAR responses are listed as follows:

SCAR Classification:	**Urgent**	**Standard**
	(Calendar days from the receipt of the SCAR or RMA)	
Problem verification and containment plan	< 2 Days	< 5 Days
Final report with corrective action plans identified	< 15 Days	< 30 Days

Lumentum SQE will specify the classification of the SCAR in the SCAR form upon issuing to the supplier.

Supplier shall be responsible to submit verification data to Lumentum for final closure of the SCAR as per the implementation plans.

11.4.1 Supplier Non-Responsiveness and Escalation:

If a supplier fails to satisfactorily address a failure, or has repeat non-conformances for an issue or is non-responsiveness to the Lumentum's timelines for a SCAR, then the internal team may determine actions such as the following are required:

a) Escalation to the Lumentum's and/or supplier's higher management for actions and commitments
b) Return of all potentially affected material without establishment of failure's responsibility for credit, replacement or reimbursement
c) Stop shipment on future orders of affected parts
d) Cancellation of existing purchase orders
e) Supplier part disqualification
f) Supplier disqualification

11.5 Traceability

Supplier shall be required to maintain material and process traceability by serial number, batch or lot for all materials shipped to Lumentum. The traceability extends to materials, material expiration dates, processes, equipment, manufacturing location and personnel used in the manufacturing process. The traceability records must be maintained for the period required by Lumentum's record retention policy.

11.6 Failure Analysis

FA initially focuses on failure mechanism (what failed as opposed to why it failed). In circumstances where Lumentum or Lumentum's contract manufacturers or Lumentum's customers discover parts made by Supplier are failing, but it is not yet obvious or proven to be the fault/responsibility of Supplier, Lumentum can and will often solicit Supplier assistance in failure analysis. Such assistance is expected until such time that the reason for the failure can be determined to not be the fault/responsibility of Supplier. If/when the failure is determined to be the fault/responsibility of Supplier, then Sections **11.1** through **11.5** apply.

12. LUMENTUM PARTS APPROVAL PROCESS REQUIREMENTS (LPAP)

The goal is to ensure that all Lumentum component requirements are understood and that the component suppliers are able to consistently meet the manufacturability capabilities, performance, quality, and reliability requirements. Suppliers shall submit LPAP plan and deliverables by Lumentum's product development stages (Step 1: Evaluation & Selection Stage, Step 2: Design Development / Product Validation, Step 3: Supplier Process Development / Qualification, Step 4: Supplier Performance Monitoring / Continuous Improvement). The supplier shall develop a LPAP plan and deliverables within the timeframe agreed to by the Lumentum SQE. Reference 10139520-280, Lumentum Parts Approval Process.

12.1 Specification / Drawing Review

Formal supplier review and acceptance / exceptions of component drawing requirements, specifications, purchase order notes, reference documents, and other special requirements as part of the supplier quotation process. The supplier to document any exception.

12.2 Process Flow Diagram/Process Control Plan

The Supplier shall prepare (and provide upon request) a process flow diagram (also called a process control plan) that serves as a comprehensive flow diagram of the overall process from receipt of purchased material to shipping that includes:

- All operations, inspections and test points
- Incoming material into the process
- Critical parameters defined to control quality of each process/part
- Statistical control techniques used to control processes/out of control action plans.
- Inspection or test methods including sampling/test plans used and acceptance criteria
- Equipment used for test, inspection and measurement. Gage Repeatability and Reproducibility (GR&R) studies to demonstrate the capability of the equipment and measuring process may be required.

12.3 Process Failure Modes and Effects Analysis (PFMEA)

It is required that the supplier develop a PFMEA for parts that Lumentum has designed. The RPN should be used to rank and flag the process risks. The results will be used to determine the appropriate test and inspection points as well as the appropriate control methods and procedures. Suppliers shall

demonstrate completion of recommended actions where RPN exceed cut off scores as decided by their cross functional team. Results of the PFMEA shall be recorded and available for review upon request by Lumentum SQE. If the supplier is responsible for the component design a Design FMEA is also required.

12.4 Quality Prediction and Goals

Either as part of the PFMEA or based on design targets or by other means, suppliers shall identify anticipated quality levels and reliability targets. Specific quality improvement goals shall be set and accomplished throughout the entire production cycle.

12.5 Process Qualification

Each product produced by suppliers shall have a process qualification package that defines how the process was qualified and what are requirements. This package should include all the test or inspection plans (test plan), reliability plans (if applicable), capability analysis, audit plans, etc., and the data that substantiates the decision to consider the process qualified. This data shall be made available when requested by the Lumentum SQE. Changes requiring PCN shall require Lumentum's prior written approval and follow the guideline as listed in Section **9**.

12.6 Product Qualification

For supplier-designed parts/products, Supplier shall be required to have a formal qualification program in place to evaluate/measure product quality and reliability to approve parts/products for the marketplace, and to assure they full meet the intended form, fit, and function before shipment. Qualification data must be made available to Lumentum Sourcing Manager or Lumentum SQE upon request.

12.7 Failure Analysis and Corrective Action

Supplier failure analysis support and corrective action is expected to meet Lumentum's requirements as described under Section **11**.

12.8 Gauge Repeatability and Reproducibility (GR&R)

GR&R for manufacturing measuring equipment must be performed prior to release for manufacturing use and after major equipment repairs. As part of the GR&R, a P/T will be calculated based on Lumentum's product specifications. The gauge will be removed from the process if the results of P/T ratio is greater than 30%. The GR&R and P/T calculation worksheets and results must be reported to Lumentum prior to product release for mass production. If multiple inspection equipment is used interchangeably when inspecting parts for Lumentum, the Supplier must prepare a correlation report that proves interchangeability.

P/T <10% tolerance — **acceptable**.

10% ≤ P/T ≤ 30% tolerance — **conditionally acceptable** dependent on importance of application, cost of gauge engineering approval, etc.

P/T >30% tolerance — **not acceptable**. Repair, retrain, or use other measurements means or obtain Lumentum's approval if other measurement systems are not available

12.9 Sub-Tier Supplier Management

Suppliers' quality plans are required to maintain a sub-tier supplier quality program to monitor and improve Lumentum key suppliers' performance. This may include supplier qualification and first article approval process, procedure and policy management, corrective action management, major supplier quality event reduction, supplier failure analysis support, supplier process improvement, counterfeit avoidance measures, and supplier facility audit. If applicable, Lumentum may require routine reports on the key sub-tier suppliers. Formats and frequency of the reports shall be mutually agreed upon by the

parties. Suppliers shall provide a supply chain map at Lumentum's request, clearly showing what process steps and/or raw materials and/or sub-assemblies the supplier has outsourced from sub-tier suppliers.

13. ONGOING RELIABILITY MONITORING OR TESTING (ORM or ORT)

The purpose of ongoing reliability testing is to monitor the reliability of qualified parts/products to ensure those products continue to meet Lumentum's reliability expectations and requirements for products. Ongoing reliability testing is used to monitor the Early Life Failure Rate (EFR), and Mean Time Between Failure (MTBF). EFR should be expressed in defective parts per million (DPPM), and MTBF is expressed in hours. MTBF data can be obtained through Reliability Demonstration Test (RDT).

Supplier shall be required to have in place ongoing reliability programs that monitor production on a routine basis (appropriate torture testing to industry standards at no added cost to Lumentum).

14. CONFIGURATION CONTROL

Suppliers shall have a procedure in place to control product configuration, product revision, software revision (including product software or testing software) and firmware revision changes when applicable. Such changes may require Lumentum approval and shall be well defined in the procedure.

15. RECORDS RETENTION

Suppliers shall ensure all records related to the procurement, manufacturing, assembly, testing, and delivery of product sold to Lumentum are maintained for as long as a business reason exists, with five years as the minimum requirement. Minimum retention time may vary due to customer specification, contract, industry standards, country specific legislation or other reasons.

16. HANDLING, PACKAGING, LABELING, STORAGE & SHIPPING

Suppliers' parts/products for Lumentum must be handled, packed, labeled, stored and shipped per the requirements as listed by the appropriate Lumentum drawings, product specifications, customer requirements, and industry standards.

In cases where no specific Lumentum documentation is available, parts/products must be handled, packed, labeled, stored and shipped such that containers and their contents arrive at their destination damage free. They must be packaged so that they are protected from any abrasion, nicks, dents, scratches, contamination, corrosion, tarnish, etc., as required. This includes the use of protective materials, restraining, or cell packaging, when necessary, to prevent any shifting or rubbing that may induce damage. For parts/products such as (but not limited to) semiconductor components that have been identified by manufacturers and/or industry associations and standards as requiring protection against Electro Static Discharge (ESD) or being a Moisture Sensitive Device (MSD), suppliers shall follow those requirements and shall handle, pack, label, store and ship as defined in APPENDIX A.

17. PROCESS CAPABILITY (Cpk) REPORT AND EXPECTATIONS

Supplier to monitor all Critical to Function (CTF) parameters based on Lumentum drawings and calculate the Cpk index. CTF are typically defined by a racetrack circles surrounding critical parameters. If CTF parameters are not defined, supplier to monitor critical parameters agreed upon with Lumentum SQE. Lumentum's expectation is that the supplier will:

- measure the CTFs by manufacturing lot
- record the CTFs by manufacturing lot
- calculate the Cpk for each CTF parameter

- provide the lot specific production data when requested by Lumentum
- provide the lot specific Cpk report when requested by Lumentum

For critical parameters where the Cpk are below 1.33, mitigation plans are required and made available when requested by Lumentum.

18. PROCESS YIELDS

Supplier to monitor and document first pass and final process yields. Lumentum expectations is that the supplier will:

- measure first pass and final process yields by manufacturing lot
- record the first pass and final process yields by manufacturing lot
- provide first pass and final process yields when requested by Lumentum
- define yield targets by process maturity and put in place mitigation plans to meet yield targets, plans to be made available when requested by Lumentum

19. SHIPMENT DATA PACKAGE REQUIRMENTS

For each product shipment the supplier is required to provide the following data unless otherwise stated.

- CoC for each lot shipped
  - Part Number/Rev
  - Shipment Date
  - Shipment Quantity
  - Lumentum PO Number
  - Second level sub-supplier CoC/CoA
    - Manufactures CoC, if purchased directly from Original Manufacture
    - Authorization letter from the Original Manufacture if purchased from authorized distributor
    - Shipping invoice with OEM trace code/lot information if purchased from authorized distributor
  - Dimension & Cosmetic Report (LAT)
  - Shelf Life (expiration date)
  - Technical data for UL as per the specifications
  - Name/Signature/Date
- CoA for each lot shipped where defined in the drawing/specification/PO requirements
- REACH, RoHS Compliance documentation
- LAT for each CTF and other defined requirements. Sampling per ANSI/ASQ Z1.4-2003 for the following items. Reference LAT Definition 4.21

Commodity	Inspection	Packaging	LAT Sampling
Optical /Mechanical	Visual	All	ANSI Z1.4 0.65 AQL C=0 (Level II)
Electrical Parts- Active	Visual	Reel/Tube packaging- Original Package	5pcs/package

Commodity	Inspection	Packaging	LAT Sampling
Electrical Parts- Active	Visual	Reel/Tube packaging- Partial Package	1pcs/package
Electrical Parts- Passive	Visual	Full Reel/Tube packaging- Original Package	Not required
Electrical Parts- Passive	Visual	Reel/Tube packaging- Partial Package	Partial reel: 1 pcs / reel Tray: AQL 0.65 Level II
Electrical Parts / PCBA	Visual	Tray Packaging	ANSI Z1.4 0.65 AQL C=0 (Level II)
Electrical	Electrical Test	All	Passive component required 1 piece per reel for Electrical Value check. CAP/Resistors/Inductor per IPC standard
Optical /Mechanical	Dimensional / Functional	All	ANSI Z1.4 0.65 AQL C=0 (S2)
Electrical Parts- Passive	Dimensional / Functional	Original Package	Not required
Electrical Parts- Passive	Dimensional / Functional	Partial Package	3 pcs/ lots

20. FAI (FIRST ARTICLE INSPECTION)

Suppliers are required to provide First Article Inspection reports at time of first shipment of Rev000 of any Lumentum item number appearing on the Purchase Order. Suppliers are further required to complete and submit FAI reports whenever there has been more than 12 months since the last PO for Rev000 from the Supplier, as well as whenever the next revision is first ordered from the Supplier.

FAI requirements do not apply to “off-the-shelf” catalog items that the Supplier offers to the general market.

FAI reports must demonstrate compliance to all Lumentum requirements and specifications. Prior to part shipment to Lumentum, all non-compliances must be resolved and rectified or an approved deviation covering any non-compliances must accompany the FAI report.

FAI reports must be reviewed and approved by Lumentum before first articles are deemed acceptable. Any discrepancies or non-compliances to Lumentum’s specifications identified in the FAI report may require the parts to be remanufactured and resubmitted to Lumentum with new FAI reports prior to FAI acceptance.

The FAI report will be submitted in softcopy and/or hardcopy as requested by Lumentum.

At Lumentum’s discretion, a Lumentum Supplier Quality Engineer (SQE) may be required at the supplier L manufacturing site during the first article inspection and report preparation.

21. TOOL LIFE CONTROL

Suppliers are required to provide tool life expectancy and tool life control for injection molds, metal stamping dies, and die casting molds.

- For new tooling:
  - Supplier is required to include the tool life expectancy for the tool in the quotation for the component to Lumentum GCM.
  - Supplier is required to set up the tool life monitoring system, and this tool life record has to be updated per production run and be available for review by SQE.

- For existing tooling:
  - Supplier is required to set up the tool life monitoring system, and the record be available for review by SQE.
  - Supplier is required to provide monthly updates on the tool life record to GCM and SQE. For low volume suppliers, quarterly update shall be permissible per advice from GCM.
  - Supplier is required to set a trigger to inform SQE and GCM when the tooling has less than 20% in balance of tool life.
  - Supplier is required to follow FAI process for any new tooled parts per new fabricated tooling in case the first tooling is running end of life.
  - Supplier is required to perform FAI for components manufactured from tooling with less than 20% balance of tool life expectancy to ascertain all parameters are maintained within drawing specifications.
  - After the maintenance of the tool is completed, its extended tool life has to be recorded into the tool's tool life record.
  - Supplier is required to add the balance of tool life count in CoC for parts produced with tooling that have tool life control.

APPENDIX A

Supplementary Supplier Quality Requirement for Commodity Component or Sub-Assembly Suppliers for Lumentum

1. Moisture Sensitive Devices

Unless specified by other Lumentum specifications, components that have been designated as moisture sensitive must be shipped in moisture barrier bags that meet the latest version of IPC-JEDEC-J-STD-033 (Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices) requirement. If the package seal date is over one year of age compare with the ship date, parts have to be re-baked according to the IPC-JEDEC-J-STD-033 and reseal accordingly before shipment.

2. Date Coded Material

For shelf life requirements, refer to Lumentum document 10139520-141 latest revision.

3. Shelf Life

For shelf life requirements, refer to Lumentum document 10139520-141 latest revision.

4. Performance Reviews

Key suppliers, (suppliers considered to be key to Lumentum’s success) as selected by Lumentum Commodity Management and/or Procurement teams, can be scored based on the Technology, Quality, Responsiveness, Delivery, Cost Performance, and Social Responsibility (TQRDCS) model. Suppliers’ statuses may be updated based on the results of these reviews.

EXHIBIT 1

Form # 10139523-011

(Supplier to request latest revision)

LUMENTUM **DEVIATION REQUEST FORM** **Status: UNRELEASED**

Dev No.: **Effective From:** **Effective To:**

Originator:	**EDC:**	**Origination Date:**
Contact Email:		
Site(s) Affected:	**Change Category:**	
Affected Item(s):	**Product Line(s):**	
	Change to a Safety Critical Part, Product Markings or Labeling, External Documentation, or Other Regulatory Impact:	
Quantity/Lot Dependence/Serial Number Range:		

Disposition Instructions:

Description of Change:

Reason for Change:

Notes / Special Instructions / Additional Detail:
Deviation Reference Files (see Agile PLM):

Additional Details:

EXHIBIT 2

Form # 10139523-045

(Supplier to request latest revision)

LUMENTUM **Supplier Product Change Notice**

Supplier Name	
Supplier Manufacturing Site Address	
Date of Supplier PCN Request	**Request must be 180 days before the proposed change. If not, justification is required and mitigations to cover 180 day potential gap required.*
Supplier Planned Change Implementation Date	
Lumentum CCR/MCO Number:	*To be filled in by Lumentum*
Description of Change	
Reason for Change	
Effect of Change and Risk Assessment	
Qualification/ Reliability Testing Plan & Results and Performance Verification Results	
**Including before and after capability analysis*	
Affected Lumentum Part Numbers	
Attachments	
Remarks	

Supplier Signature		***Date***	
Supplier PCN Status	☐ Approved ☐ Rejected ☐ On-hold for Further Qualification		
Lumentum Signature		***Cutover Date***	
Supplier Material Disposition Notes			

Warning: Any fundamental (Major) change to a product, material, design, manufacturing process and location that can affect any aspect of form, fit, function, quality or reliability performance in accordance with the product specifications must be formally approved in writing by Lumentum before implementation.

EXHIBIT 3

Form # 10139523-268

(Supplier to request latest revision)

Issue Date : YYYYMMDD

Supplier name or Logo

CERTIFICATE OF CONFORMANCE

- Customer Part Number : xxxxxxxx Rev. xxx
- Supplier Part Number : xxxxxxxx Rev. xxx
- Shipment Date : YYYYMMDD
- Shipment Quantity : xxxx Pcs
- Customer PO Number : xxxxxxxx
- Invoice No. : xxxxxxxx
- MFG Name : xxxxxxxx
- MFG Part Number : xxxxxxxx Rev. xxx

MFG Lot no.	MFG Date	Shelf life	Expired date

- Dimension & Inspection Report (LAT) ◯ YES (Refer attached) ◯ No * not applicable for chemical/epoxy
- Certificate of Analysis Report (COA) ◯ YES (Refer attached) ◯ No *applicable just for chemical/epoxy

- Technical data for UL as per the specifications shown in the drawing (pls complete the table)

Critical Component	Manufacturer / Trademark	Type / Model	Technical Data

Mold Type	Mold number	Balance of Mold Life (number of shots)	No. of cavity	
Die Casting				
Injection Molding				
Stamping				

We hereby certify that all items in the above shipment have been produced, inspected and found to be in compliance with applicable drawings, customer specifications or standards, RoHS, REACH and or purchase order requirements.

All documents utilized were of the latest revision in effect on the date of this order or as specified by the buyer. Substantiating records are on file subject to review upon request.

Signature xxxxx Date: yyyymmdd

Name : xxxxx Phone: xxxxxxxxxx

Title : xxxxx e-mail: xxxxxxxxx

Supplier Name : xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Address : xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

ACKNOWLEDGEMENT FORM

Company name first then check off one box or the other

_____,

hereby acknowledge receipt of the Lumentum Document 10139520-244 entitled Quality Requirements for Suppliers .

We agree to:

☐ Follow the procedures governing quality management with this receipt in accordance with 10139520-244.

☐ Follow the procedures governing quality management with this receipt in accordance with 10139520-244 with following exceptions.

Exception List:

Company name (at the top of this Acknowledgement Form)

Person's Name: _____

Title: _____

Signature: _____

Date: _____

Fill in and return this Acknowledgement Form to LumentumSQE@Lumentum.com