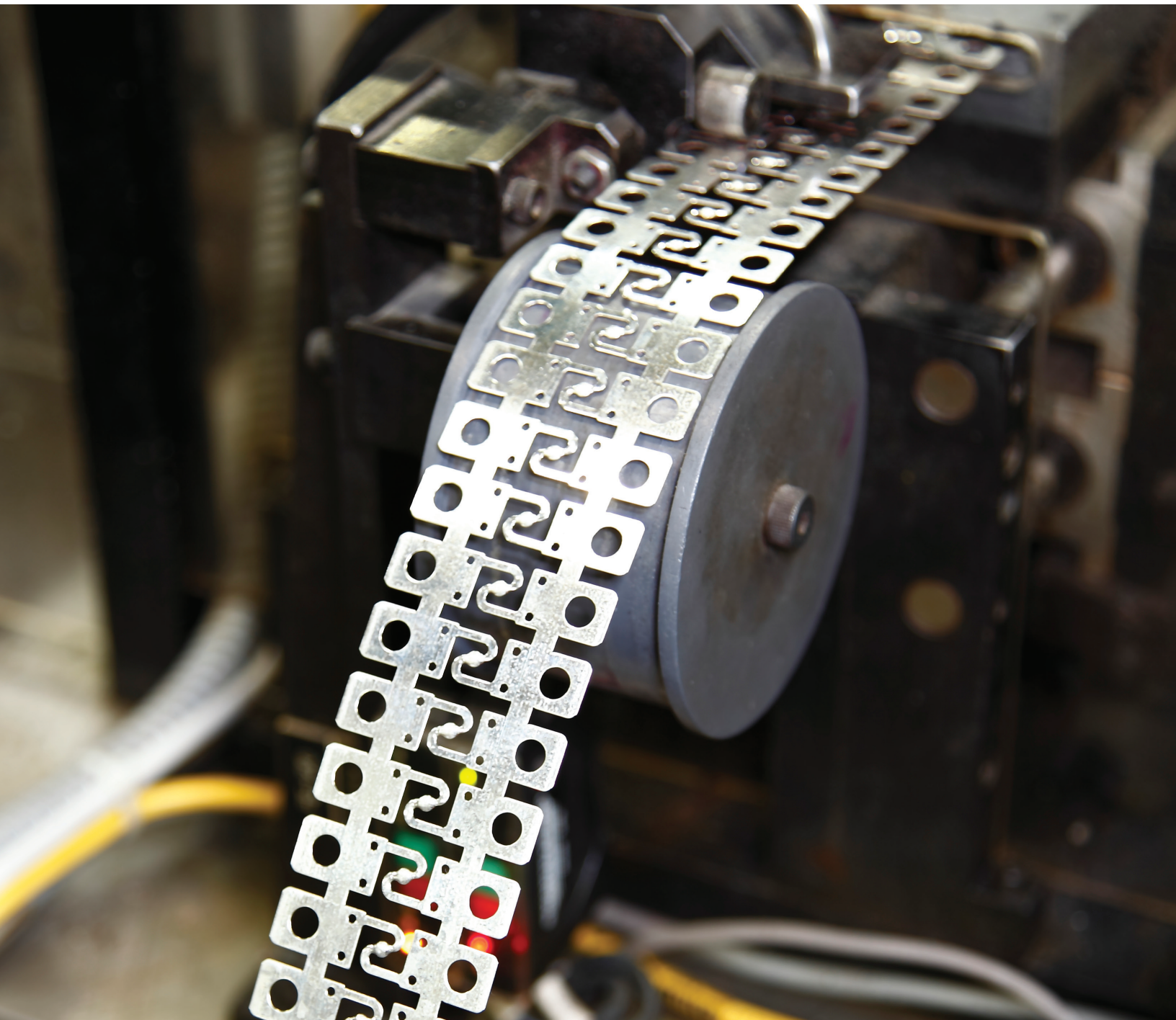




Expertise Applied | Answers Delivered

## SUPPLIER QUALITY MANUAL



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## GENERAL QUALITY EXPECTATIONS

Our expectations of suppliers and ourselves extend beyond the basic entry criteria that correspond to quality, delivery and cost to encompass service, technical knowledge, continuous improvement and more!

We set high standards that apply to Littelfuse and to our suppliers. Our suppliers are responsible for ensuring the quality of their products, meeting our DPPM & quality incidents requirements established in our procedure of supplier rating system or QMP. With a goal of zero defects, meeting delivery commitments, and keeping costs competitive.

All suppliers are also expected to deliver high quality service, maintain appropriate inventory, demonstrate technical knowledge and make continuous improvements. We look for suppliers who are flexible, committed to growing the relationship and focused on the end user. In return, we provide the support, information and resources needed to help our suppliers meet these expectations, and to jointly achieve our goal of total customer satisfaction.

What we expect from you:

- Quality products that fully meet specification
- Environmental compliance
- On-time delivery
- Competitive costs
- Adequate inventory
- Technical knowledge
- High quality service
- Continuous improvement
- Shared goals, and
- Commitment to the business relationship

All of the sections in this manual describe the specific requirements and expectations for doing business with Littelfuse.



## SUPPLIER REQUIREMENTS MATRIX

The following matrix describes the requirements for supplier qualification for doing business with Littelfuse.

Supplier Type	Risk Assessment	Environmental Testing	ISO Required	TS/IATF Required	Self Survey Required	LF Validation Testing Required
Direct	Yes <sup>1</sup>	Yes	Yes <sup>2</sup>	Yes <sup>3</sup>	Yes	Yes
Indirect	Optional	Yes	Yes <sup>2</sup>	Optional	Yes	Yes
MRO (Maintenance, Repair, and Operations)	No	Optional	Optional	No	No	No
Distributor	Optional	Yes	Yes	No	Yes	Yes
Special Services (Testing, Calibration, etc.)	Optional	Optional	Yes <sup>4</sup>	Optional	Optional	Optional
Directed Suppliers	Optional	Yes	Optional	Optional	Optional	Optional

- Transportation and delivery suppliers are qualified and managed by the Global Logistics Department.
- In cases where a requirement is “Optional” depends on how that product interacts with the customer. For example, Distributors may require a risk assessment if they are considered Critical.

<sup>1</sup> Risk Assessments are required of all direct and critical suppliers as soon as practical. However, if a large, brand-name supplier (GE, DuPont, Lear, etc.) or the chemical supplier refuses to allow LF to assess them, the risk assessment can be skipped if there is consensus between global SDE director, global procurement director & operations manager.

<sup>2</sup> For non-automotive direct and indirect suppliers ISO certification becomes mandatory starting year 2017, before this date those suppliers that are not ISO but already belong to Littelfuse supply chain will be considered as approved supplies.

<sup>3</sup> All Automotive direct suppliers are required to be certified in IATF 16949; or provide a plan on achieving IATF certification as a company goal. Non-Automotive suppliers are not required to obtain IATF unless otherwise specified by Littelfuse.

<sup>4</sup> For testing, calibration service the organization MUST be ISO 17025 or similar

**Direct Supplier** – Any supplier of materials that are used in the creation of Littelfuse products. This will also include suppliers of pass-through or private label products sold by Littelfuse or outside processing suppliers. Examples include plastic resin, resistance wire, purchased fuse holders, plating, coating, painting, subassembly etc.

**Indirect Supplier** – Any supplier of material that is included with a product sold by Littelfuse but not part of the actual product. Examples include boxes, labels, foam packaging, blister packages, bulk chemicals, etc.

**MRO Supplier** – Stands for Maintenance, Repair and Operations. MRO Suppliers provide items and/or equipment that are necessary to produce Littelfuse products. Examples include cleaning supplies, paper towels, machine oil, small tools, repair parts, etc.

**Distribution Supplier** – Any supplier that buys products from many manufacturers, stores the products, and then resells it to Littelfuse for production. Distributors can provide direct or indirect material for production but have little to no control over the quality of the materials they sell.

**Special Services Supplier** – Any supplier that provides services to. Examples include outside testing laboratories, gage calibration services, major vehicle/equipment maintenance services, etc.

**Directed Supplier** – Any supplier directed or required by customer with official evidence.

Transportation and delivery suppliers are qualified and managed by the Global Logistics Department.

Note: In cases where a requirement is optional depends on how that product interacts with the customer. For example, Indirect materials suppliers and Distributors may require a risk assessment if they are considered Critical.

## SUPPLIER PROCUREMENT AGREEMENT

All goods and services procured by Littelfuse, Inc. shall be in accordance with the Littelfuse Supplier procurement agreement unless otherwise stated in writing. Littelfuse supplier will be expected to adhere to all of the requirements as specified in the agreement. If there is any question about the procurement agreement document, please contact with Littelfuse Procurement.



## QUALITY SYSTEM REQUIREMENTS

A current and recognized quality system is essential to start doing business with Littelfuse. In addition to being an overall good business practice, it also is a requirement of many of Littelfuse customers. Documentation is a key element in providing all necessary proof that a supplier's quality system is being followed and that materials provided are within Littelfuse drawing specifications.

### QUALITY PROGRAM

Suppliers providing direct and indirect material to Littelfuse are required to maintain Quality Management System [QMS] certification as indicated in section "Supplier Requirement Matrix". A copy of the certificate(s) must be submitted to the Supplier Development Engineer [SDE] upon initial receipt and upon each expiration date. Other regulatory requirements, such as but not limited to, UL, are established on the drawing as needed.

Existing suppliers that are not meeting the above-mentioned requirements will face the possibility of losing the business opportunity with Littelfuse. New suppliers that are not meeting the above-mentioned requirements will not be qualified as approved supplier.

### NOTIFICATION OF QUALITY MANAGEMENT SYSTEM CHANGE [QMS]

Supplier shall notify Littelfuse of any change in their QMS registration status via e-mail within 10 working days (after change was done) to the Supplier Development Engineer. Such changes include, but are not limited to:

- Initial Certification. \*
- Recertification. \*
- Transfer or certification to a new Certification Body. \*
- Certificate withdrawal.
- Certificate cancellation without replacement.

\* These changes require submitting proof of registration as described above.

If the supplier has multiple facilities where Littelfuse products are made, one certificate with a scope covering all production facilities or each individual plant's certificate must be given to the Supplier Development Engineer. If one certificate can't cover each plant, supplier need to submit individual certificate from each plant to supplier development engineer.

### MANAGEMENT RESPONSIBILITY

The Supplier's executive management will develop a company-wide quality policy. This policy will be deployed and understood by all employees. A management review system will be implemented. The Quality policy and system will be reviewed at prescribed intervals to assess the continuing suitability and effectiveness of the quality system. This review will include the quality policy, internal audit results, product complaints/returns, process/product quality reports, and others as they apply. Executive management will appoint a management representative with the responsibility/authority to monitor compliance to the system, and to ensure corrective/preventive measures are implemented.

### ORGANIZATION

The Supplier will have an organization that supports implements and maintains the quality system at all levels.

### QUALITY POLICIES, PROCEDURES, AND WORK INSTRUCTIONS

The Supplier shall establish and maintain a documented quality program as a means of ensuring that product and/or services comply with the requirements set forth in this standard. All work affecting the quality of products and/or services shall be documented in clear and concise policies, procedures, and work instructions. The Supplier shall ensure that these documents are deployed, effectively implemented and understood within the company.

### INTERNAL AUDIT PROGRAM

The Supplier shall implement an effective internal audit program that provides for the following: gap analysis, process audits and system audits. Only qualified auditors will conduct audits and will be independent from the area being audited.

### EXTERNAL AUDIT

The external audit by certificated company (such as ISO, IATF, TS) should be implemented with regular audit schedule and all audit record with corrective action should kept in database.

### TRAINING

The Supplier shall establish and maintain a program for the identification of training requirements for all personnel that affect the quality of a product during production and installation. Qualification to perform assigned tasks shall be based on individual education, training and/or experience as required. The Supplier shall also assure that a system exists for the qualification, re-qualification, and disqualification of personnel. As a minimum, training for applicable personnel shall consist of quality system training, auditing techniques, Supplier Quality Engineering processes, assembly techniques, workmanship standards, and inspection requirements. Supervisors in the production area shall also have a working knowledge of quality systems and statistics. Records of all training shall be maintained and made available for Supplier Development Engineer to review upon request.



## ENVIRONMENTAL, HEALTH, AND SAFETY (EHS) REGULATIONS

Compliance with the Littelfuse Supplier Environmental, Health and Safety Specification (see Appendix A) and all government and local regulations regarding environmental controls is mandatory for all Littelfuse suppliers. The EHS Policy is based on all Littelfuse customer requirements regarding substances of concern. Although this document covers most requirements in general, the parts that you provide might have special requirements that are above and beyond those listed in the EHS Policy. Please refer to the Supplier Procurement Agreement documents for any special requirements. In general, Littelfuse is focusing on the reduction and elimination of:

- Lead
- Cadmium
- Specific forms of Chromium (Hexavalent Cr)
- Mercury
- Specific Brominated Flame retardants
- Perfluorinated chemicals (PFOS and PFOA)
- Substances in the current candidate list of the REACH Substances of Very High Concern

**IMDS submissions** (International Material Data System) are required of all Automotive SBU suppliers for every part they provide to the ASBU. Creating an IMDS account is free of charge, and can be done at [www.mdssystem.com](http://www.mdssystem.com). Instructions for creating modules in IMDS are on the site. This is not a Littelfuse-maintained system, so any questions about the IMDS program or its operation should not be directed to Littelfuse. All IMDS submissions should be directed to account number 2426.

**IPC Declarations** are required from all direct and indirect raw materials and finished goods suppliers to Littelfuse. Maintenance, Repair, and Operations items are generally excluded from this requirement, although there are exceptions. Your Cover Addendum document will highlight any MRO

purchased items that will be subject to the IPC Declarations requirement. Every part number provided to Littelfuse must have a declaration, either individually or as a part family (if the family of parts contains the exact same material but only changes dimensional characteristics). This document must be resubmitted if there is any change to the raw material components or a change in supplier.

**ICP Testing** (Inductively Coupled Plasma Spectrometry) might also be a requirement highlighted on your Cover Addendum. Suppliers will be required to send their own materials out to an independent lab for testing and submit the results to Littelfuse; this test is required to be done every year to verify the consistence of RoHS compliance. Suppliers would bear the testing cost. Results of these tests are submitted to our customers upon request to prove compliance to customer substance of concern requirements. If a product is found to have any substances of concern over acceptable limits as defined in the EHS Policy, or found to have a significant change in characteristics to indicate a change in raw materials without prior notification, supplier need notice Littelfuse SDE in written within 24 hours, and a corrective action will be requested. Note: XRF (X-Ray Fluorescence) testing is not an acceptable substitute for ICP Testing.

**Material Safety Data Sheets** (MSDS) must be submitted to Littelfuse for all raw materials used in the creation of all Littelfuse products. These are the documents that define all characteristics of a material from a safety perspective. Suppliers are responsible for collecting these documents from their own suppliers or for the creation of their own MSDS. All MSDS documents must be submitted to Littelfuse initially and anytime there is a change.

Littelfuse takes the safety of its workers and those of its suppliers very seriously. All suppliers must follow all applicable laws and regulations regarding worker safety.





## EICC COMPLIANCE

Littelfuse expects our product material suppliers to act as responsible corporate citizens and take a positive, proactive stance regarding social and environmental issues. Suppliers are REQUIRED to provide a policy of continuous improvement and acknowledgement of EICC compliance to us. Littelfuse will provide self-assessment questionnaire or training material upon supplier's request. The Electronic Industry Code of Conduct may be voluntarily adopted by a business in the electronics sector and subsequently applied by that business to the suppliers. Fundamental to adopting the Code is the understanding that a business, in all of its activities,

must operate in full compliance with the laws, rules and regulations of the countries in which it operates. The Code is made up of below 5 sections:

- Labor
- Health and Safety
- Environmental
- Management System
- Ethic

For more information about adopting the EICC or becoming a member of the Electronic Industry Citizenship Coalition visit the web site: <http://www.eicc.info>.

## CONFLICT MINERALS REQUIREMENTS

Based on the U.S. Securities and Exchange Commission (SEC) final rule on Conflict Minerals, US Federal Law section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, the rule requires publicly-traded companies to disclose annually whether tin, tantalum, tungsten or gold in their products originated in the Democratic Republic of the Congo (DRC) or adjoining countries.

Also, Yunnan Tin (smelter number CID002180) may be associated with an entity appearing on the Office of Foreign Assets Control's ("OFAC") Specially Designated Nationals and Blocked Persons List, namely their alleged association with the United Wa State Army (UWSA) in Myanmar. To that end, due to Yunnan Tin's alleged association with OFAC-sanctioned

Specially Designated Nationals, we request that you discontinue sourcing from Yunnan Tin and begin sourcing from alternate smelters, and/or request Yunnan Tin to disengage from association with OFAC-sanctioned persons.

We require our suppliers commit to a socially responsible supply chain that supports the humanitarian goal of ending the violent conflict in the DRC. To create a transparent supply chain, we are collecting and disclosing sourcing information related to conflict minerals via EICC-GeSI Conflict Minerals Report. It is imperative that our suppliers need provide the required smelter information. In case it is not available, it is expected to contact sub suppliers, or trickle down to their sub-tier suppliers, to obtain what is needed.

# LITTELFUSE RISK ASSESSMENT PROCESS

Littelfuse uses a documented Risk Assessment process to evaluate suppliers on a regular basis.

Based on the audit purpose and scope, the audit type is chosen:

- QMS and Process audit – to be used for any type supplier assessment
- Process audit per VDA6.3 – to be followed under customer request and practiced within Automotive Business unit suppliers.

The final overall score ranking of the risk assessment will determine audit result and supplier classification.

For QMS and Process audit:

Result [%]	Classification	Description of the classification
score ≥ 85	A	Quality-capable
70 ≤ score < 85	B	Conditionally quality-capable
score < 70	C	Not quality-capable

For Process audit per VDA6.3

Result [%]	Classification	Description of the classification
score ≥ 90	A	Quality-capable
80 ≤ score < 90	B	Conditionally quality-capable
score < 80	C	Not quality-capable

The lead auditor will release the audit report to the supplier based on the team’s decision. Supplier needs to reply with their corrective actions for the findings within 1 month. Lead auditor needs to review supplier’s corrective action report to ensure the effectiveness, through documented evidence, on-site verification, re-audit if needed, etc.

An ultimate goal for suppliers is to be qualified as “A” – Quality capable. A new business award or continuity is possible without restriction.

Upon successful completion of the risk assessment, approved suppliers are added to the Littelfuse Approved Supplier List. Supplier On-site Evaluation Template (see Appendix B)

# LITTELFUSE SELF-SURVEY FORM

Prior to doing an On-Site Risk Assessment of a supplier, we send a Supplier Self-Survey. This survey gives us some basic information about the supplier and their capabilities, and allows Littelfuse auditors some familiarization with the supplier before visiting. The last section of the survey should do with Company Security, which is part of a requirement by U.S. Customs to maintain Littelfuse’s C-TPAT (Customs-Trade Partnership Against Terrorism) certification. To maintain our certification and our ability to ship product across the border

quickly and efficiently, we must ask every supplier about what security measures they have taken in their own facilities. The answers given in this survey are used in the Risk Assessment; 11 random “Yes” responses on the survey are chosen to be verified during the On-Site Risk Assessment. The Self-Survey must be returned within 5 days of the Risk Assessment to allow us time to review the responses and choose the questions Littelfuse auditors will verify.

Supplier Self Survey Template (see Appendix C)



## ADVANCED PRODUCT QUALITY PLANNING (APQP)

Suppliers are required to generate an Advanced Product Quality Plan in accordance with the AIAG APQP reference manual for every new Littelfuse automotive part. At a minimum the plan should include the five phases and listed contents below:

Plan and Define Program Phase  
Kick-off Meeting / Technical Review / Risk and Feasibility Assessment / Program Review

Product Design and Development Phase  
DFMEA / Design Review PAF

Process Design and Development Phase  
Prototype / Gage Review / Process Flow / PFMEA / Control Plan / Program Review

Product and Process Validation Phase  
Proactive Containment / PPAP / Run-at-rate study / Program final review

Feedback, Assessment and Corrective Action Phase  
Lessons Learned / Early Production Containment completed / Open Issues closed

Suppliers for Littelfuse parts are required to develop a project management timeline. Littelfuse procurement and Supplier Development Engineers will review the project schedule as necessary or at requested intervals.

## PRODUCTION PART APPROVAL PROCESS (PPAP)

Littelfuse uses the Production Part Approval Process to confirm that the supplier understands the design specifications and has a process capable of producing product to meet these requirements, during an actual production run, at the quoted production rate. An industry requirement for all automotive suppliers, PPAP is being expanded to include all of our suppliers.

PPAP requirements vary based on the submission level assigned to a supplier and/or part number. The Littelfuse Supplier Development Engineer is responsible for designating submission level. The submission level is generally determined during the RFQ process.

If there is not signed PSW, there is no approval from Littelfuse then the parts cannot be shipped.

In addition, suppliers are required to provide an update to their PPAP base on customer request.

Littelfuse expects all PPAP submissions to be free of any costs and fees unless properly documented during the original RFQ, Contract and/or Terms and Conditions agreements.

PRODUCTION PART APPROVAL PROCESS (PPAP)		PPAP Level				
		1	2	3	4*	5
1	Design Record		R	R	S	R
2	Engineering Change Documents			R	S	R
3	Customer Engineering Approval			R	S	R
4	Design FMEA			R	S	R
5	Process Flow Diagram			R	S	R
6	Process FMEA			R	S	R
7	Control Plan			R	S	R
8	Measurement System Analysis Studies			R	S	R
9	Dimensional Results		R	R	S	R
10	Material, Performance Test Results		R	R	S	R
11	Initial Process Studies			R	S	R
12	Qualified Laboratory Documentation		R	R	S	R
13	Appearance Approval Report (AAR)	R	R	R	S	R
14	Sample Product		R	R	S	R
15	Master Sample				S	
16	Checking Aids			R	S	R
17	Records of Compliance (Substance of Concern & Conflict Minerals)		R	R	R	R
18	Part Submission Warrant	R	R	R	R	R

Figure 1 - PPAP Submission Levels from PPAP latest edition by AIAG  
R = Required (unless not applicable)  
S = Submit upon request  
\*Level 4 PPAP: get guidance from SDE  
Littelfuse Supplier Production Part Approval Process Manual (see Appendix D)  
Littelfuse Supplier Production Part Approval Process Form (see Appendix E)



## QUALITY MANAGEMENT PLAN (QMP)

Littelfuse uses Quality Management Plan (see Appendix F) to guide supplier to continuously understand, anticipate, meet, and exceed the Littelfuse quality requirements, it also serves supplier to define, measure, monitor, and tailor the commitment to quality. This plan details the quality requirements for the specified products or commodity, and it covers all the quality activities that will be addressed from the design through the mass production phases. It is the

responsibility of the supplier to ensure that this document is effectively communicated to the appropriate functions, such as Quality and Manufacturing, and it shall govern all interaction between the two companies with respect to quality of product unless otherwise specified in the Purchase Order. This plan should be acknowledged and signed by supplier's Quality Representative or the management team.

## SPECIAL CHARACTERISTICS

Special Characteristics are any product or process characteristics that affect safety or compliance with regulations, fit, function, performance or subsequent processing of product.

In accordance with the requirements of IATF 16949 / TS 16949, Special Characteristics shall be identified and specifically addressed in the Design-FMEA, Process-FMEA, Control Plans, Process Flows, Work Instructions and other associated documents. Suppliers are responsible to fully understand the usage of their product and identify Special Characteristics, as appropriate.

Littelfuse expects suppliers to improve quality by systematically reducing variation of the special characteristics. Control plans document relevant information about the process followed to address sources of variation

until a key characteristic is in statistical control and capable of meeting engineering specifications.

Key characteristics are typically identified by Littelfuse, and are noted on the design drawings. For each of the key characteristics, the supplier identifies: where in the process, the characteristic is measured, control charts used, sample size and frequency of collection, maintenance of control charts and initial Cpk.

A gage variation study is performed and results are documented, potential sources of variation are identified and controls are established to ensure that process parameters and settings do not change. This is documented in the key characteristic control plan. Suppliers are also responsible for ensuring that relevant Special Characteristics are explained, understood and controlled by their sub-suppliers.

## STATISTICAL PROCESS CONTROL AND ANALYSIS

Suppliers are required to meet the process capability requirements as defined in the AIAG PPAP and SPC reference manual. The supplier is responsible to ensure process capability and control requirements are documented in their control plan and that capability indices are achieved and improved throughout production.

Also, the supplier is required to continuously improve by reducing part-to-part variation and eliminating all waste. The organization shall monitor process performance utilizing the appropriate statistical techniques (i.e. First-pass yield, SPC,

etc.) in accordance with the most current edition of the AIAG Statistical Process Control manual.

Additional areas in which statistical techniques may be applied are as follows: predictive maintenance programs, gage R&R studies, defect analysis and continual improvement processes. The results of the statistical techniques shall be documented and retained at the organization's location. This information shall be made available upon request by the Littelfuse team.

## APPROVED SUPPLIER LIST

There are 3 possible status outcomes for suppliers: Approved, Conditionally Approved and Disqualified. Only suppliers with Approved can be on the Approved Supplier List. The SDE and Procurement will meet minimally on a semi-annually to review the performance of Conditionally Approved suppliers whose status is ready to change.

Any supplier who Littelfuse has been doing business with before January 1st, 2003 and have not had a risk assessment since that date are considered to be Approved.

## NOTIFICATION OF CHANGES - SPCN

Any change to the product FORM, FIT, MATERIAL or COMPONENT, FUNCTION, LOCATION, PRODUCTION PROCESS or SUB SUPPLIER must be approved in advance by Littelfuse. Any of these type changes to previously approved parts or materials cannot be made without prior approval. This approval will be given upon review of the change documents (PCN) submitted to Littelfuse (explanation of the change, product validation and dimensional documentation). Littelfuse requires 90 days advanced notice of changes. In some cases, Littelfuse plants will decide if they need sample parts to test to confirm there is no impact to our process. If that is

required, Littelfuse will coordinate with supplier team to accomplish that in a mutually satisfactory manner. In the case of materials change updated ICP data and IPC declarations may be required.

To request approval, supplier can use Supplier Product Process Change Notice Form (see Appendix G) or initiate the sPCN through the Littelfuse Supplier Quality portal: <http://www.littelfuse.com/suppliers> to Supplier Development Engineer or Procurement.



## PERFORMANCE MEASUREMENT – SUPPLIER SCORECARD

The Supplier performance is measured based on three (3) elements, each element is being weighted to the performance metrics that are being emphasized during yearly management review meeting. The Supplier rating is based on a weighted average of all elements combined. The target for Suppliers should be Score 100. For an explanation of the scoring calculations, see the Figure below.

### QUALITY ELEMENT- RATIO OF ENTIRE SUPPLIER RATING SCORE – 50'

Metric	Explanation	Score Method	Score
Quality Incident	Quality issue at customer side/Littelfuse plant/IQC	if Incidents $\geq 2$ , the score=0; if Incidents=1, the score=5; if zero Quality Incidents, the score=25	25 (50%)
DPPM	Rejective Rate of supplier shipped quantity	Each Category DPPM, please refer to the reference. e.g: Ceramic Target 5000, if DPPM>5000, Score=0 If DPPM<5000, the score will be 0 to 10 in proportion	10 (20%)
Disruptions	Issue which caused the line stop or affect Littelfuse's reputation in customer side	Serious Incidents $\geq 2$ , the score=0 ,If serious incidents=1, the score=5 , if zero serious Incidents, the score=10	10 (20%)
Responsiveness	Issue (3D/8D) response time	3D/8D response 100% in time: Score=5, otherwise, Score= 0	5 (10%)

### NPI ELEMENT-RATIO OF ENTIRE SUPPLIER RATING SCORE – 20'

Metric	Explanation	Score Method	Score
PPAP % full on-time	PPAP on-time Finish Rate	PPAP 100% on-time, the score=10 PPAP 0%-99% on-time, the score will be 0-9 in proportion	10 (50%)
Launch IRR	Quality Incidents during safe launch stage or ramp up (6 months after PPAP approved)	Safe launch stage quality incidents $\geq 1$ , the score=0, Safe launch stage quality=0, the score=10	10 (50%)

### DELIVERY-ELEMENT RATIO OF ENTIRE SUPPLIER RATING SCORE - 30'

Metric	Explanation	Score Method	Score
OTD (On-time Delivery)	Actual on-time items received / Committed or Planned items received	If OTD is 80% below, score is 0. From 80% to 100%, score is 0 to 20 in proportion	20 (67%)
Premium Freight	The incidents of premium freight which not planned or controlled by Littelfuse (no matter the freight value)	If incidents are $\geq 2$ , the score is 0, If incident = 1, the score is 5, If incident = 1, the score is 10,	10 (33%)

Figure 2 - Supplier Scorecard Criteria

Suppliers who maintain an overall rating of A are considered good.

Suppliers who have an overall rating of B are considered marginal acceptable. 2 consecutive months B grade, the Procurement and Supplier Development departments shall review these suppliers performance monthly and determine the reaction plan (e.g., asking for supplier corrective action and improvement, weekly meetings).

Suppliers who have an overall rating of C may be considered unacceptable. The following actions shall be taken.

2 months C grade in 3 consecutive months - The Procurement and Supplier Development departments shall review these

suppliers' performance monthly and determine the reaction plan (e.g. visiting the supplier, providing training to suppliers if necessary, asking for supplier corrective action and improvement).

3 months C grade within a period of 6 consecutive months - The Procurement team shall hold all new business opportunities. No RFQ activity with supplier.

6 months C grade within a period of 12 consecutive months – The Procurement team shall implement a plan for de-sourcing and stop purchasing from this supplier, or state the reasons for keeping using this supplier.

The overall rating score is determined as below:

<b>WEIGHTED SCORE</b>	<b>The Weighted Overall score is determined as follows:</b>	
	<b>90%-100%</b>	<b>A</b>
	<b>70%-89%</b>	<b>B</b>
	<b>&lt;70%</b>	<b>C</b>

## BUSINESS CONTINUITY PLAN

Littelfuse requires our suppliers to prepare business continuation plan (e.g. utility interruptions, fire, flood, storm damage, temporary or limited data loss, chemical spills, air/water contamination, earthquakes, tornados, hurricanes, storm surges, complete data loss,) to reasonably protect Littelfuse' s supply of product if a supplier's facility cannot continue to operate. Please refer to the Terms and Conditions document for further guidance regarding Force Majeure or acts of God. Plans should be reviewed on an annual basis by to ensure that the contingencies listed are still valid. Business Continuation Plan should not be confused with internal Health and Safety plans.

Supplier shall notify the Littelfuse buyer and Supplier Development Engineer representative within 24hrs about a major production interruption which risks the delivery of a Purchase Order. Supplier shall communicate the nature of the problem to Littelfuse and take immediate actions to assure supply of product to Littelfuse.

Note: production interruption is defined as an inability to meet the Littelfuse specified capacity volume.





## CONTROL OF NONCONFORMING PRODUCT

The Supplier's quality program shall have an effective system for controlling nonconforming product. The system shall provide for the identification, documentation, evaluation, segregation, and timely disposition of nonconforming products. The Supplier's system shall include controls for product returned from Littelfuse.

### REVIEW AND DISPOSITION OF NONCONFORMING PRODUCTS

The nonconforming products will be including the following dispositions:

- Use as is: no actions taken on product, product does not meet specified requirements, but is functional
- Rework or sorting: product reworked or additional product test/inspection to meet specified requirements. Supplier shall assign capable rework or sorting person to Littelfuse to do rework and sorting or Littelfuse assigns at supplier's cost.
- Reject or replace: product returned or replaced with new lot by supplier to meet specified requirements. Supplier shall assign RMA (Return Material Authorization) for this particular rejection or replacement within 24 hours.

In the event the non-conforming part or material results in costs to Littelfuse (costs may include charges related to sort, rework, repair, scrap, production downtime, customer charges, products recall and shipping costs), Littelfuse reserves the right to charge the supplier costs associated with the non-conformance.

### SUPPLIER CORRECTIVE ACTIONS – SUPPLIER CaWeb

Supplier caWeb is the Littelfuse Global Supply Chain's on-line Corrective and Preventative Action System. This system provides our global supply base with easy access to their concerns in real time and the ability to quickly respond and communicate containment actions with Littelfuse. It provides a structured and methodical approach to document permanent corrective actions by suppliers. It also provides a history in case the supplier's solution was not effective and needs to be reviewed. Every supplier has access to the system as long as supplier requests from regional Supplier Development Engineer.

The Supplier caWeb system is used any time a supplier quality issue arises. Issues requiring corrective actions include, but are not limited to: late deliveries, non-conforming material, incorrect labeling, environmental testing issues, quantity discrepancies, and production line shutdowns.

This centralized system is accessible to all our plants around the world and uses the 8D format for problem management. Suppliers are responsible for managing their own responses and entering them into caWeb by the due date.

The respective reaction time period as defined in the table below ("Time table") shall begin with the initial notification to the Supplier by Littelfuse that a problem exists. The instance level shall be set to "priority" for the High Impact incidents may have potential Littelfuse or Littelfuse customer line stop, reliability risk, components in safety applications and customer recall. Upon request the Supplier shall provide top management support in the 8D team as part of an adequate escalation process.

Provide 8D report up to 4D - with Potential Root Cause indicated and be supported with investigation action plan. If defective sample is needed for potential cause verification [e.g.: electrical / function failure], while waiting for sample arrival, the team to provide comprehensive containment action plan, ensuring the interim production is being protected and able to screen out the defect.

Final Report submission – Root cause analysis completed, supported with Corrective Action Plan and Preventive Action Plan.

At times, Littelfuse may have tighter or more stringent requirement on response time for specific critical issue, and we need suppliers to comply with such requirements.

Time Table:

8D disciplines	Priority (High Impact)	Standard
D1: Establish Team D2: Problem Description D3: Interim Containment Actions	Released within 24h	Released within 24h
D4: Identify root cause(s)	Released within 24h	Released within 3 days
D5: Identify the permanent corrective action D6: Validate the corrective action	Released within 7 days	Released within 14 days
D7: Prevention of Repetition D8: Congratulate the Team	Per agreed plan	Per agreed plan

Supplier caWeb 4 Instructions (see Appendix H)

Supplier caWeb Address – <http://caweb4.hginet.com/LFSupplyBase>

## CRITICAL RISK SUPPLIERS ESCALATION AND IMPROVEMENT PROCESS

Critical Risk Suppliers Escalation and Improvement Process is the program that identifies critical risk with high business impact suppliers. Littelfuse focus the effort on Continuous Improvement program using tools such as controlled shipping to work with the suppliers for containment and improvement to ensure suppliers can deliver good product that meets LF requirement and expectation.

Based on the supplier performance cut off score, the SDE will determine if a Controlled Shipping is the correct tool to drive supplier improvement.

Controlled Shipping Level 1 (CS1) requires the supplier to implement additional off-line 100% inspection of product to contain specific failures at the supplier location by supplier employees.

Controlled Shipping Level 2 (CS2) is initiated if the CS1 containment implemented by the supplier fails to contain non-conforming products within their own facility.

New Business Hold Level 1 (NBH1), is initiated when supplier enters Controlled shipping level 1 and does not meet cut off score. NBH1 allows for limited New Business to the supplier, the deviation needs multi-level reviews throughout Procurement and SDE to identify the extenuating circumstances. Procurement creates letter/Email with limited category/models and deviation duration then obtains approvals from Global Procurement Director and SDE Director.

New Business Hold Level 2 (NBH2), is initiated if a supplier in NBH1 fails to exit from Critical Risk Supplier List cut off score in next risk scoring evaluation. NBH2 requires no New Business released to the supplier; any deviation must obtain approval by LF Operation Vice President.

Supplier risk assessment will be reviewed every half year. Refer to Critical Risk Suppliers Escalation and Improvement Process in Appendix I.



## MATERIAL TEST REPORTING

The Material Test Report must contain the actual results of physical testing, measurements and/or analysis specified by the contract confirming compliance with all identified requirements. Blanket statements of material conformance without data to support it will not be accepted.

Suppliers must submit the material testing report in electronic format or paper format with the packing slip of each shipment sent to a Littelfuse location.

The supplier should have a system capable of retrieving and submitting the requested Material Test Report or any characteristic data in the approved control plan within 24 hours of Littelfuse request.

CoC (Certificate of Conformance) is required to attach for each shipment to Littelfuse or keep in supplier's quality document system for audit upon Littelfuse request. Suppliers can use

own form for CoC or contact respective Supplier Development Engineer for Littelfuse form.

Provide 8D report up to 4D - with Potential Root Cause indicated and be supported with investigation action plan. If defective sample is needed for potential cause verification [e.g.: electrical / function failure], while waiting for sample arrival, the team to provide comprehensive containment action plan, ensuring the interim production is being protected and able to screen out the defect.

Final Report submission – Root cause analysis completed, supported with Corrective Action Plan and Preventive Action Plan.

At times, Littelfuse may have tighter or more stringent requirement on response time for specific critical issue, and we need suppliers to comply with such requirements.

## SUB-SUPPLIER CONTROL

Supplier may not engage any sub-supplier without the prior written authorization of Littelfuse. Suppliers are required to monitor their sub-suppliers' performance and to assure the quality of purchased parts and the management system of their sub-suppliers. Suppliers are responsible for providing disposition of defective parts due to their sub-suppliers poor control. This is including consigned supplier like plating supplier unless the supplier is billed by Littelfuse.

Requirements for sub-suppliers (sub-tier suppliers) management:

- Suppliers are recommended to have a strategy in place to develop their sub-suppliers' quality management system with the goal of continuous improvement. Conformity with ISO9001 as well as RoHS Directive (or similar) is the first step in achieving this goal.
- In the event of significant Quality Incident, Littelfuse Supplier Development Engineer reserves the right to audit the Quality Management System of a sub-supplier and request the resourcing of the business to a different vendor

- Suppliers are required to keep lot control (traceability) data of key sub-supplier materials and processes as well as representative data in conformance to drawings and specifications.
- Cascade and communicate all Littelfuse quality requirements throughout the organization supply chain.
- Conduct an on-site process audit (or equivalent) for all critical materials, parts and processes.

- Develop and maintain a list of approved suppliers for each sub-component, raw material, commodity, technology or purchased service. The supplier shall have a documented process and use assigned personnel to monitor and manage sub-suppliers' performance.

NOTE: Sub-tier suppliers are defined as organizations that are providers of: a) production materials, b) production, service, and accessory parts, or c) heat treating, plating, painting or

## CONTINUOUS IMPROVEMENT

Continuous improvement is fundamental to our business. At a minimum we require that our suppliers manage their quality systems to the same IATF 16949 /TS16949 or ISO 9000 standards that guide Littelfuse quality efforts, and to demonstrate continuous improvement in areas that benefit the customer with regards to quality, price and service.

The supplier shall continually improve quality, delivery, cost and other services provided. To aid in fulfillment of this requirement the supplier's organization shall establish, monitor, prioritize, and act upon key performance objectives and targets. The objectives and targets should be established based upon (at a minimum) business plans, management systems, product quality, process capability, and customer satisfaction goals. Actions taken to regain previously sustained levels of performance are corrective actions, not continuous improvement.

Littelfuse may visit any supplier site to assess its continuous improvement programs and lean manufacturing practices, and make recommendations for improvement. In addition, Littelfuse may deploy personnel to focus on specific improvement issues. Littelfuse will also select key suppliers for development who present the big opportunity for improvement and who present the great potential impact to the organization. Once a supplier has been selected, a cross-functional team consisting of Littelfuse and supplier

will be formed to work together to ensure that certain targets are achieved. Littelfuse may choose to provide training to suppliers on quality tools skills, 6 sigma or Lean production for process improvement.

Some common examples of Continuous Improvement programs are:

- Cost reduction projects (examples include use of Six Sigma, Lean Enterprise, Value Analysis/Value Engineering)
- Waste reduction projects (examples include use of Kaizen events, Setup Reduction, Value Stream Mapping, Standardized Work, Process Flow)
- Variation reduction projects (examples include use of Six Sigma, Standardized Work, Statistical Process Control)
- Factory Reorganization projects (examples include use of 5S Program, Single Unit or Cellular Manufacturing, Focused Factory, Kaizen events)
- Inventory reduction projects (examples include use of Kanban system, Single Unit or Cellular Manufacturing, Supermarket Pull)
- Yield improvement projects (examples include improvements to Equipment Uptime/Downtime, First Pass Yield, Rework reduction, Scrap improvement, On-Time Delivery)
- Non-manufacturing Process Improvement projects (examples include Customer Service, Accounting, Purchasing, Warranty returns, Quality control)



## IDENTIFICATION AND TRACEABILITY

The aim of traceability shall be to minimize the impact and consequences of quality concerns. The Suppliers shall maintain an appropriate traceability system.

For all Littelfuse products, the supplier shall establish and maintain procedures for identifying the product during all stages of production including receipt, work in process, storage, and delivery. In addition, lot traceability of all sub-components, raw materials and process inspection data shall be maintained. Each production lot shall be identified by a supplier lot number.

The supplier lot traceability system must provide for the following situations:

- Permit isolation of suspect product on a precise basis based upon lot number on each container.
- Barcode identification of supplier lot number on each container. This lot number must be the key to all traceability in the supplier's system.
- Localize causes of failure and take corrective action at minimal cost to supplier and Littelfuse.
- Determine traceability to component lot numbers and production / quality data specific to the lot number identified on the container (backward traceability).
- Determine supplier finished product lot number(s) produced with a given lot of components or on a given shift of production (forward traceability).
- Each lot of die colorant for plastics

## PACKAGING AND LABELING

Suppliers must comply with all import/export and customs regulations for their home countries. The Supplier shall ensure provide for secure storage areas or stock rooms to prevent damage or deterioration of product prior to consumption and/or delivery to Littelfuse. The Supplier shall implement a First In First Out (FIFO) system for disbursement of product from storage. The Supplier shall ensure all parts/products are packed, marked and preserved as defined in specifications. Parts/products shall be packaged to prevent damage and/or deterioration while facilitating usage requirements on the Littelfuse plants and during shipping.

Littelfuse requires the Supplier to be responsible for product delivery quality until point of issue to Littelfuse plants or distribution center.

Littelfuse standardizes the label format and requirement for all purchased materials to eliminate data entry errors, ensure accurate use of logos, and maintain lot traceability. The Supplier shall comply with the labeling requirement for inner and outer pack which is defined in Littelfuse Bar Code Labeling Spec. (see Appendix J)

# RECORD RETENTION

Suppliers must establish a system to manage record retention. The system should fulfill and comply with supplier internal requirement as well as Littelfuse requirement. Unless otherwise indicated, all Littelfuse suppliers are to maintain record retention for minimum of 3 years. For suppliers that supply to automotive industry, minimum record retention is Production and service requirement plus 1 years. Whenever there is overlapping requirements, the more stringent requirements will apply.

# CUSTOMER SPECIFIC REQUIREMENT

From time to time, Littelfuse may receive additional customer specific requirements from its customer or end customer, which are applicable to its supply chain. Upon receiving such requirement from Littelfuse, the supplier is expected to implement the requirement and ensure full compliance. Supplier is expected to share technical confidential or proprietary information with Littelfuse if required as long as we have signed Non Disclosure Agreement (NDA). Any exception has to be brought up to Littelfuse attention for further discussion and agreement.

## SUPPLIER ROLES, RESPONSIBILITIES AND AUTHORITIES – SUPPLEMENTAL

The Supplier shall notify Littelfuse (it's Supplier Development Engineer Representative) via e-mail within 10 working days of any change to senior management responsible for product quality or company ownership.

## SPECIAL PROCESS ASSESSMENTS

For those vendors in a supply chain associated with a Littelfuse automotive Business Unit, the supplier and its sub-tier suppliers shall audit specific manufacturing processes (see list below) annually to determine its effectiveness. Applicability and effectiveness of these processes shall be determined utilizing the most current version CQI standard. The effectiveness evaluation shall include the organization's self-assessment, actions taken and those records are maintained.

- Heat Treating – CQI-9 Special Process: Heat Treat System Assessment.
- Plating – CQI-11 Special Process: Plating System Assessment.
- Coating – CQI-12 Special Process: Coating System Assessment.

- Welding – CQI-15 Special Process: Welding System Assessment.
- Soldering – CQI-17 Special Process: Soldering System Assessment.
- Molding – CQI-23 Special Process: Molding System Assessment.

The latest edition of the reference documents listed above applies unless otherwise specified by Littelfuse. Copies of all reference documents except those specific to Littelfuse are available from the AIAG at the following link: [www.aiag.org](http://www.aiag.org).

Internal audits and 2nd party assessment must be conducted by a competent auditor. An auditor is competent if they meet the following requirements:

- They shall be a qualified ISO lead auditor, or a qualified intern auditor with evidence of their successful completion training, and minimum of five internal ISO/ TS16949:2009 and/or IATF 16949:2016 under the supervision of a qualified auditor.
- They shall have a minimum of five years' experience working with the process that is being audited or a combination of experience and education in the specific process.

NOTE 1 : If the organization does not have a competent auditor, audit shall be conducted by a 3rd party competent auditor.

NOTE 2 : Suppliers and its sub- tier suppliers shall send annually the results of the specific manufacturing process audit via e-mail to its supplier development engineer representative.



## ANNUAL RE-QUALIFICATION / DIMENSIONAL LAYOUT

The Supplier shall re-qualify its components in case of changes and regularly at least once a year. A qualification-monitoring program for reliability and environmental tests must be maintained in order to ensure and demonstrate that the delivered components meet all the agreed requirements. Re-qualification documentation shall be archived by Supplier and send it via e-mail to its Supplier Development Engineer representative. To ensure continuing conformance to all Littelfuse requirements, a complete annual dimensional

layout inspection, including all sub-components, shall be required for all production parts and components unless waived in writing by Littelfuse Supplier Development Engineer representative. Any such waiver shall be subject to annual review and renewal.

The results must be submitted via e-mail to the Supplier Development Engineer representative.

## SUPPLIER ACKNOWLEDGEMENT

Supplier is required to acknowledge the acceptance of Littelfuse Supplier Quality Manual. If there is any exclusion / deviation required, supplier should indicate the details in the Appendix K - Supplier Quality Manual Acceptance Form and submit to Littelfuse for review and approval.

## APPENDICES

- Appendix A – Supplier Environmental, Health and Safety Specification
- Appendix B – Supplier On-site Evaluation Template
- Appendix C – Supplier Self Survey Template
- Appendix D – Supplier Production Part Approval Process (PPAP) Manual
- Appendix E – Supplier Production Part Approval Process (PPAP) Format
- Appendix F – Supplier Quality Management Plan
- Appendix G – Supplier Product Process Change Notice Form
- Appendix H – Supplier caWeb 4 Instructions
- Appendix I – Critical Risk Suppliers Escalation and Improvement Process
- Appendix J – Littelfuse Bar Code Labeling Specs
- Appendix K – Supplier Quality Manual Acceptance Form

## CHANGES / DOCUMENT HISTORY

Revision	Originator	Changes / Description	Date
A	Sam Peng	Initial document number CHI-10SDE-001-A and reset the revision from I to A  Add critical risk supplier program, annual re-qualification, supplier acknowledgement. Updated supplier requirements matrix, PCN notice, Scorecard, caWeb time table and some appendices.	Jul.15, 2017
B	Yoshisumi K	Update supplier requirement matrix  Update score for Littelfuse risk assessment process.  Update section of performance measurement – Supplier scorecard.	Oct.9, 2017