1 Scope and Purpose
The purpose of this document is to outline the expectations that Benchmark Electronics Inc. (BEI) has in relation to our suppliers.

2 References
BE-24014 Att 1 Quality (Restriction) Codes
BE-43002 Supplier Barcode Labelling Requirements
BE-46003 Printed Circuit Board Specification
BEF-46006 Supplier Acknowledgement and Confirmation
BEF-46007 Amendment to Supplier Assurance Manual

3 Definitions

4 Supplier Partnership Statement
Suppliers and supplier performance are critical to BEI’s success as a global Electronics Manufacturing Services (EMS) provider. Without the skill, dedication and hard work of our suppliers, BEI would be unable to meet the needs of our customers. As such, BEI regards our suppliers as partners in our business model.

While BEI recognizes our suppliers have their own internal quality systems and business processes, we feel it is important to document and communicate BEI’s expectations in regard to our relationship with suppliers.

Certain exceptions to compliance with specific elements of the SAM may be granted by BEI with appropriate justification. These exceptions shall be documented on form BEF-46007 and approved by BEI and the supplier.

Suppliers striving to be a corporate preferred source should complete form BEF-46006 to confirm their compliance and return the form to BEI. All other suppliers are encouraged to submit the acknowledgement and should still meet all the expectations as laid out in this document.

Benchmark may require compliance to specific legal or regulatory requirements. When applicable, these special legal or regulatory requirements will be specified in the purchase order or other agreement with the supplier.

BEI suppliers shall at all times allow for the right of access by BEI, our customers, and regulatory authorities as required to all facilities involved in the order and to all applicable records.
5 Purchase Order Details

5.1 Terms and Conditions
BEI expects our suppliers to adhere to the terms and conditions according to the Purchase Order or as otherwise agreed. If the terms or conditions cannot be met for any reason, the supplier shall contact BEI Purchasing immediately to resolve the issue.

Price changes must be communicated a minimum of 90 days prior to the date of impact.

End of Life (EOL) and Last Time Buy (LTB) notifications must also be provided to Benchmark a minimum of 180 days prior to the LTB date.

5.2 Shipping
BEI expects all suppliers to ship goods using methods and shipping lanes previously agreed. Any deviations from standard shipping methods must be agreed to prior to execution.

5.3 Packaging
BEI expects that product will be packaged to prevent damage or deterioration under normal transportation conditions. Customer specified packaging must be used when required, and all specified packaging requirements must be met. Suppliers shall use recyclable packaging where possible and economically viable.

Unless otherwise agreed, all packaging shall be labelled per BEI document BE-43002.

5.4 Acceptable Date Codes for Electrical Components
Where a supplier is supplying BEI with electrical components, on an individual basis, these codes must be within 2 years of the date of manufacture. Where date codes are greater than 2 years the supplier shall not ship without prior BEI approval.

For assemblies which may contain components with date codes of greater than 2 years BEI assume that the suppliers have completed their due diligence prior to using these components.

5.5 Acceptable Shelf Life for Shipped Components
Supplier shall not ship a product to BEI where less than 75% of the total shelf life remains without prior notification and BEI approval.

5.6 Material Regulations
The supplier is obligated to monitor changes within the regulations for any hazardous substances defined by regulation or local laws and inform Benchmark.

As defined, the supplier is obligated to confirm to Benchmark in writing about all materials used for or in the products where needed to comply with:

- EC regulation 1907/2006 (REACH)
- Substances listed in the current form of the EC directive 2002/95/EC (RoHS)
The supplier may also be required to provide data to BEI in the format requested to support compliance with the United States Dodd-Frank Wall Street Reform and Consumer Protection Act Section 1502. Where other governing bodies make rules regarding the use of conflict minerals, the supplier must determine whether additional disclosure is required.

5.7 Printed Circuit Boards
Printed Circuit Boards (PCB) are foundational to our business. Therefore we have provided the Printed Circuit Board Specification (BE-46003) for our PCB suppliers that defines the minimum acceptable requirements applicable to the fabrication of printed circuit boards for Benchmark Electronics. Compliance to this specification is mandatory unless BEI provides a written waiver.

5.8 Quality\Restriction Codes
Benchmark uses Quality\Restriction Codes internally and on purchase orders to communicate specific needs and awareness to flow down expectations in addition to direction provided in Purchase Order text as necessary. When these numeric codes and titles appear on a purchase order, the supplier should seek clarification and understanding, if not already confirmed, through BE-24014 Att 1 and the BEI purchasing agent.

6 Quality Management

6.1 Management Systems
BEI suppliers must establish and maintain a documented quality management system which is certified, where possible, to the most current revision of ISO 9001 by an accredited 3rd party registrar. Industry specific registrations and regulations may also be required. BEI may grant exceptions to this requirement pending specific circumstances.

6.2 Quality Plan
A quality plan should be established for each product supplied to BEI. This quality plan shall include all requirements for controlling the quality of the product. These requirements may include (but are not limited to) incoming inspection, process controls, in process inspection, final inspection, equipment and product validation, verification of personnel training\qualification and competence, testing, packaging, and shipping. These quality plans shall be reviewed and updated on a regular basis to take into account any changes to the product, corrective actions implemented, etc. They shall also be available for BEI to review upon request.

6.3 Process control
BEI believes that placing more emphasis on process control than just product quality will ultimately provide a product that consistently meets the requirements. In order to develop a world-class process, a complete evaluation shall be carried out to determine capability and stability of the process performance. Appropriate methods shall be put in place to control the processes.
As part of an effective Process Control Plan BEI, expects the supplier to use one or more of the following tools or techniques: process flow charts, process failure mode and effects
analysis (PFMEA) and similar tools, control plans which identify all critical part features and key characteristics according to design documentation and critical process parameters, gage repeatability and reproducibility (GR&R) on all measurement equipment used for quality decisions with GR&R <20%, statistical process control (SPC) on all critical processes with minimum Cpk=1.33, clearly defined procedures to deal with out of control conditions, and any other applicable tools.

BEI expects that suppliers will make their internal process performance results available for review upon request.
Continuous improvement goals or targets should also be established for process performance.

6.4 Product\Process Qualification
Benchmark and an end customer may require on-site product\process qualification protocols. This requirement will be communicated as required. Submission of the Quality Plan and Process Controls and any other communicated expectations should be expected at a minimum.

6.5 Control of Nonconforming Material
All suppliers shall have a formally documented process for the control of nonconforming material. This process shall include procedures and methods for the following:

- Clear identification and labelling of nonconforming material
- Purge and physical segregation of nonconforming material from acceptable material
- Quarantine and securing of nonconforming material to prevent accidental use
- Prevention of shipment of nonconforming material
- Responsibility and authorization for disposition of nonconforming material
- Feedback into the Benchmarks continuous improvement process.
- Notification to the customer (BEI) of non-conforming material that has shipped immediately after the issue is identified

Suppliers shall not knowingly ship nonconforming material to BEI without concession and written approval from an authorized BEI representative. Material shipped with approval may require additional documentation and labelling upon shipment.

6.6 Quality Records
BEI expects suppliers’ record retention will be in accordance with their Quality Management System or as defined by the purchase order or customer requirements, e.g., ISO 13485 and CFR Part 820 require records to be kept for the lifetime of the product, while a customer may require records be kept beyond the life of the product.

7 Process or Product Change Disclosures
BEI recognizes that supply chain changes are a part of business, and has the following requirements for these changes. The supplier shall report every change regardless of scale or magnitude to BEI.
Full details on all changes should be e-mailed to pcn@bench.com.

7.1 Production Location Change
If a change of location (or the use of a sub-tier supplier) is unavoidable, BEI expects our suppliers to provide at least 90 days advance written notice. BEI may also require a detailed transition and qualification plan with background on key drivers for the change.

7.2 Plant Closures
BEI expects at least 90 days advance notice of any scheduled extended plant shutdowns, where extended is taken to mean greater than 2 days excluding government approved national holidays. This is needed since holiday times vary from country to country.

7.3 Production Process Change
BEI expects our suppliers to effectively manage process changes with appropriate validation or verification and approval prior to implementation. BEI expects 90 days advance notice from the supplier for any major process change and a detailed description of background for this change.

This notice shall include technical documentation which supports the recommended or required change. This requirement includes sub-tier suppliers.

7.4 Material Change
Material changes may occur due to end-of life situations, quality improvement, cost reduction or other reasons. BEI expects 90 days advance notice of recommended or required changes, including a detailed description of the background of the issue and technical justification and documentation which supports the recommended or required change. This expectation includes sub-tier suppliers.

7.5 Sub Tier Supplier Changes (Non-Franchised Sources for Electrical Components)
BEI expects immediate notification of the intent to procure material from a Broker or Secondary (Non-Franchised) source. This notification shall include a detailed description of the issue with justification and documentation that supports the change in source. Such purchases must be approved in advance by BEI and may also require approval from the end customer.

7.6 Customer-Requested Changes
If a BEI customer requests a change directly from the supplier, the supplier shall notify BEI for approval before the change is implemented.

7.7 Re-qualification Requirements
BEI or BEI customers may require re-qualification of the product or process for any of these defined changes. Re-qualification plans and subsequent results must be approved by BEI and the end customer prior to the delivery of material to Benchmark. BEI expects our suppliers to facilitate this re-qualification process. If samples are required for a re-qualification BEI expects suppliers to provide these in a timely manner.
8 First Article Inspection Report (FAIR)

BEI requires suppliers to complete a First Article Inspection Report (FAIR) on all custom parts. Unless directed otherwise, the FAIR is required to be provided with the first delivery of any part and subsequently each time the part undergoes any change that affects or potentially affects fit, form, function, quality, safety, reliability or appearance. This includes when there is a gap in manufacturing of the part equal to or greater than two (2) years. In certain cases, BEI may request the FAIR prior to the first delivery and would be communicated via the purchase order.

Any discrepancies or deviations in a FAIR shall be documented and communicated to BEI prior to shipping product. Product which has failed a FAIR shall not be shipped without prior approval from BEI. BEI will provide the supplier with the specific requirements necessary to be completed by the supplier for the FAIR submission depending on the commodity type and any unique requirements.

At a minimum, the FAIR submission shall include: the part number and revision, references to applicable document and revision of drawings, specifications, standards, test methods, and procedures used, etc. to assure compliance of every dimension and note identified on the custom print.

As elements such as a process flowchart, process FMEA, quality plan, Cpk analysis on specific dimensions, verification of cosmetic criteria, verification of packaging and labelling (if specified), evidence of DFARs compliance (as required), specific FAIR template to be used, e.g. AS9102, or other specified requirements may be required.

9 Responsibility for Nonconforming Material Shipped to BEI

Discrepant or nonconforming material shipped from a supplier is a major issue and needs to be managed by the supplier in a timely manner.

9.1 Return Material Authorization (RMA) Process

Upon confirmation of a supplier’s responsibility for a material nonconformance issue, suppliers are expected to provide a RMA number to BEI within 24 hours of notification. BEI expects that the supplier will pay return freight for this material or pay BEI to scrap it.

If the material is to be disposed or scrapped at BEI the supplier is expected to reimburse BEI for the full value of the material including freight cost of the original shipment as appropriate.

Returned material shall be rescreened, reworked or replaced by the supplier at no additional cost to BEI.

9.2 On-Site Sort and Rework Requirements

The supplier may be required to provide adequately trained personnel to sort or rework material on-site at BEI in order to expedite the availability of the material and meet BEI’s production requirements. In these instances the on-site workers shall comply with all BEI safety requirements.
9.3 Additional Costs
If there are many other costs associated with receiving nonconforming material in addition to return freight and scrap, BEI expects that the supplier will reimburse BEI for all reasonable costs associated with remedy of a nonconforming material occurrence including but not limited to: purge and field recall costs, sorting costs, disassembly costs, where nonconforming material gets built into product. (This may be from finished goods or any stage of production.), or rework costs.

If such an event occurs, BEI shall provide the supplier with an estimate of expected costs and financial exposure. Actual costs will be determined based on the scope of work executed and presented to suppliers for review.

10 Supplier Corrective Action Process
BEI expects suppliers to provide corrective and preventive action (CAPA) responses that address the problem root cause upon receiving a formal BEI complaint or upon receiving a Supplier Corrective Action Request (SCAR). This should include documented root cause analysis tools and investigation details.

Upon receipt of a formal complaint or SCAR, BEI expects the supplier to initiate immediate containment actions and report these to BEI in a preliminary response within 48 hours. A supplier documented CAPA Plan must then be generated and submitted to BEI within 10 working days, unless otherwise justified and mutually agreed.

CAPA Plans shall include the committed dates for completing the specific actions and the name of the individual responsible. Be specific to the changes or corrections made (e.g. processes, equipment, staffing, and etc.). Any training solutions must include employee attendees, subject matter used, trainer name, and date of the training.

Corrective and Preventive action effectiveness shall be verified and documented by the supplier after implementation.

11 Product Lifecycle Management

11.1 Introduction
When BEI places a product with a supplier our intent is to maintain the relationship for the life of the product. However, cost, quality, delivery or other factors may result in future supplier changes. Therefore, we expect suppliers, in conjunction with BEI, to be responsible for managing all stages of the lifecycle from new product introduction through sustaining production and on to product end-of-life. BEI expects the supplier to mitigate any risk or exposure from excess or obsolete material through all these stages.

11.2 Engineering Change Orders (ECOs)
BEI expects suppliers will have a clearly defined process for managing ECOs and the timely communication of documentation. This process shall be set up to get the ECO processed in the shortest possible time while ensuring that a complete impact analysis is carried out. BEI expects the supplier to react immediately when an ECO is released to minimize any risk or exposure in the supply chain, to evaluate internal needs and
implications, and to be inform BEI immediately of any risk in executing the ECO as defined or in the expected timing.

11.3 New Product Introduction (NPI) Management
NPI projects often run to very short timelines, involve large amounts of change management and have many different organizations involved. BEI expects that suppliers will have taken this into account when bidding for new business and will have the required support in place for the NPI phase. This phase will often require much flexibility on the suppliers’ behalf – the BEI expectation is that the supplier will be prepared.

11.4 Management of Sustaining Production
BEI expect suppliers to review forecast both internally and with their sub-tiers on a regular basis to ensure that material is positioned throughout supply chain to support BEI demand. These reviews shall occur every time BEI provides a new forecast, but ideally they shall happen more often. If at any time a supplier feels that there may be a possibility of a gap in supply, for any reason, BEI expects to be informed immediately in order to allow us time to work with the supplier to mitigate the risk.

11.5 Product End of Life Management
As products near their forecasted end of life (EOL) BEI expects our suppliers to minimize exposure of obsolete material and reduce financial exposure, including consuming materials on other programs or selling it back to their suppliers. The supplier is expected to report any exposure to BEI immediately.

12 Lean Manufacturing and Six Sigma
BEI encourages our suppliers to engage in lean manufacturing and six sigma practices. We encourage our suppliers to pursue 5S, continuous improvement models, and use of six sigma tools such as DMAIC which result in cost take downs and improved quality. BEI highly encourages our suppliers to seek training and certifications in these practices and are willing to provide our suppliers with training and guidance in these areas as resources permit.
At a minimum, BEI expects suppliers to have continuous improvement programs in place and that staff and operators shall be trained in continuous improvement techniques that emphasize root cause analysis and preventive based processes.

13 Intellectual Property (IP) and Customer Owned Property

13.1 Intellectual Property
BEI expects suppliers to take all measures to protect any IP, be it the property of BEI or the Customer. IP can include, but is not limited to, product design data, product software data, product process data, product tooling, tool designs, firmware, software scripts, PCBA layout and Gerber files, 3D models.

Protection measures shall include, but not be limited to, storing all hard copy data in secure cabinets when not in use limiting access to this data to essential personnel only, destroying copies of the data that are not required, storing all computerized data on a
secure server, treating design phase data separately from normal production data, background checks on any personnel handling sensitive IP data.

In addition, any IP developed by the supplier as a direct result of working with BEI or the customer will at all times belong to the customer. This would include but is not limited to:

- Modifications to piece part drawings
- Drawings and designs for tooling fixtures
- New processes developed to produce parts

Further, it is expected that no sub-tier employee will be able to claim IP rights on any IP so developed.

If a supplier determines that IP of any kind has been leaked, BEI shall be notified immediately.

13.2 Customer-Owned Property
BEI or BEI's customer may either provide, work with the supplier to develop, or purchase supplier tooling, fixtures, testers, or other production material where BEI or BEI's customer will be the rightful owner. Such material may reside at the supplier or one of their sub-tiers. The supplier must manage and maintain such property to prevent damage or disrepair that will adversely affect the product. Any concerns should be documented and communicated to BEI immediately.

Annual updates of status and condition are suggested but may be requested or scheduled as needed by BEI.

14 Business Continuity and Disaster Recovery
BEI expects suppliers to make reasonable efforts to assess the potential impact of risks that could result in a disruption to their normal business operations. Actions to mitigate risks shall be taken where practical. Documented procedures and plans shall be developed to define the responsibilities and procedures for initiating recovery from a disaster event or shutdown of operations.

BEI recommends a formal document that covers the following aspects of business continuity and disaster recovery planning:

- Vulnerability Risk Assessments for infrastructure disruption such as utilities, communications, transportation, etc., natural disasters (flood, earthquake, severe weather, etc.), fire, labor unrest or strike, government stability, pandemic, or disasters affecting suppliers.
- Recovery Planning Needs - management succession, disaster team, teams tasks and procedures, emergency contact information, recovery planning and crisis communication, and critical IT applications (operations and data backups).
15 ESD Control
Where the supplier provides electrical or electronic parts, assemblies and equipment susceptible to damage by electrostatic discharges, they will establish and maintain a documented ESD Control Program. These materials shall be shipped to BEI facilities in a manner that does not adversely affect the properties. BEI may grant exceptions to this requirement.

16 Environmental Policy
BEI encourages its suppliers to be environmentally conscious, take all reasonable measures to minimize their impact on the environment and recycle and conserve energy wherever possible. BEI encourages its suppliers to work towards ISO14001 certification. At a minimum, suppliers shall comply with all applicable environmental regulations.

17 Social Accountability
Benchmark Electronics is committed to ensuring the sustainability of its supply chain. Suppliers are expected to conduct their business in accordance with the Electronics Industry Citizenship Coalition (EICC) Code of Conduct, and pursue a management system approach to labor, ethics, the environment and health and safety. Suppliers shall maintain and enforce internal policies and procedures that meet all applicable industrial, labor, environmental health and safety and ethics laws and regulations. Additionally, suppliers shall maintain and enforce internal policies and procedures that prevent the use of child or forced, bonded (including debt bondage), indentured, involuntary prison, slave or trafficked labor.

18 Technology Roadmap
BEI expects our suppliers to maintain a technology roadmap which shows how they will stay up to date with developments in their particular area of expertise. BEI expects suppliers to continually look for any new equipment or processes that will improve quality, or reduce lead times or costs. This technology roadmap shall act as a rolling plan that communicates strategic objectives and how the supplier will achieve them. We also expect suppliers to proactively present recommendations to drive improvement throughout the supply chain.

19 Supplier Sub-Tier Management
BEI expects our suppliers to flow down the applicable requirements of this manual to their supply chain and sub-tier suppliers. In addition, we expect suppliers to follow due diligence when selecting sub-tier suppliers. This includes performing audits, assessments, and monitoring their performance on an on-going basis with the use of scorecards or defined criteria. This data shall be available for review at any audit, and sub-tier performance issues shall be proactively communicated to BEI.

20 Supplier Reviews and Audits
BEI may periodically conduct supplier reviews with any supplier. These reviews will cover standard business metrics such as quality, delivery and flexibility, cost, and
communication. Reviews should typically be conducted at an executive level. The supplier may be requested to be on-site at a BEI site for these reviews.

Additionally, BEI may schedule on-site quality system audits or corrective action review as needed as part of managing our supply chain.

### Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev</th>
<th>Reason for Change</th>
<th>ECO Number</th>
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<tbody>
<tr>
<td>6/9/2018</td>
<td>K</td>
<td>PCB Spec added as a reference, communication of price and last time buy changes, production/process qualification information, quality/restriction codes clarification and title update. Update document template.</td>
<td>CORP003892</td>
</tr>
<tr>
<td>7/14/2016</td>
<td>J</td>
<td>Overhaul of structure to improve description flow. Significant reduction in text to remain more “on point” and reduce overall number of pages. Added Restriction Code information.</td>
<td>CORP003657</td>
</tr>
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<td>7/10/2015</td>
<td>H</td>
<td>Updated section on ESD control plus several other modifications. Update document template.</td>
<td>CORP003310</td>
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