Counterfeit Parts Avoidance Requirement for Independent Distributors and High-Risk Suppliers

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1.0 Purpose / Scope / Timing

Due to increasing global concerns over the potential of counterfeit components it is necessary to establish controls to mitigate the risk of these components entering the GE VERNOVA' supply chain. When there is a need to purchase components from non-franchised or independent distributors or supplier with high counterfeit part risk, then such purchases undergo careful evaluation to ensure the components are authentic, new, and previously unused parts.

This document is applicable for all active and passive component parts supplied to GE VERNOVA or Suppliers authorized to procure components and parts on behalf of GE VERNOVA (herein after referred to as GE VERNOVA) from independent distributors or supplier with high counterfeit part risk. Refer to EC-SRC-0009 for document that outlines the processes to be implemented by Suppliers authorized to procure components and parts from non-franchise distributor on behalf of GE VERNOVA and list of preferred independent distributors by GE VERNOVA.

1.1 Responsible Roles

- Supplier
  - Supplier is solely responsible for carrying out all necessary verification tests to ensure that the components supplied to GE VERNOVA meets the requirements of the Purchase Order and that the components are of high confident to be authentic, new, and previously unused.

1.2 Compliance Date

- Full compliance is required at the time of issuance of this document.

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2.0 Procedure / Quality Record Requirements

2.1 Purchase Orders

2.1.1 The Purchase Order issued by GE will detail the following

a. GE VERNOVA Internal Part number

b. Original Component Manufacturer

c. Original Component Manufacturers Part Number

d. Quantity required

e. Verification tests required (when applicable)

f. Any other conditions relevant to the order Sub-requirement

2.1.2 The Purchase Order shall be amended if any of the above changes.

2.2 Traceability Documentation

2.2.1 The Supplier shall confirm that, where possible, the Certificate of Conformance from the Original Component manufacturer along with the full supply chain history of the components will be provided with the order.

2.2.2 If full supply chain traceability documentation cannot be provided, then the Supplier shall perform verification tests on randomly selected samples, to establish that the components are authentic, new and previously unused as ordered by GE VERNOVA.

2.2.3 The sample size for non-destructive verification tests per AS6081 shall be:

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TABLE 1 - LOT SAMPLING PLAN

Test/Inspection	Minimum Sample Size		Level
	Lot Size 200 or greater Devices	**Lot Size 1-199 Devices** (See NOTE 1)	
Minimum Required Tests			**Level A**
Documentation and Packaging			**A1**
Documentation and Packaging Inspection (4.2.6.4.1) (non-destructive)	All devices	All devices	
External Visual Inspection			**A2**
a. General (4.2.6.4.2.1) (non-destructive)	All devices	All devices	
b. Detailed (4.2.6.4.2.2) (non-destructive)	122 devices	122 or all devices, whichever is less	
Remarking & Resurfacing (destructive)	See NOTE 2	See NOTE 2	**A3**
Solvent Test for Remarking (4.2.6.4.3 A) (destructive)	3 devices	3 devices	
Solvent Test for Resurfacing (4.2.6.4.3 B) (destructive)	3 devices	3 devices	
Radiological (X-Ray) Inspection			**A4**
X-Ray Inspection (4.2.6.4.4) (non-destructive)	45 devices	45 devices or all devices, whichever is less	
Lead Finish Evaluation (XRF or EDS/EDX)	See NOTE 3	See NOTE 3	**A5**
XRF (non-destructive) or EDS/EDX (destructive) (4.2.6.4.5) (Appendix C.1)	3 devices	3 devices	
Delid/Decapsulation Internal Analysis (destructive)	See NOTE 4	See NOTE 4	**A6**
Delid/Decapsulation (4.2.6.4.6) (destructive)	3 devices	3 devices	
Additional Tests (as agreed between Customer and Organization)			
Remarking & Resurfacing (destructive)	See NOTE 2	See NOTE 2	**A3 Option**
Scanning Electron Microscope (4.2.6.4.3 C) (destructive)	3 devices	3 devices	
Quantitative Surface Analysis (4.2.6.4.3 D) (non-destructive)	5 devices	5 devices	
Thermal Testing			**Level B**
Thermal Cycling Test (Appendix C.2)	All devices	All devices	
Electrical Testing			**Level C**
Electrical Testing (Appendix C.3)	116 devices	All devices	
Burn-In			**Level D**
Burn-In (Pre & Post) (Appendix C.4)	45 Devices	45 devices or all devices, whichever is less	
Hermeticity Verification (Fine and Gross Leak)			**Level E**
Hermeticity Verification (Fine and Gross Leak) (Appendix C.5)	All devices	All devices	
Scanning Acoustic Microscopy (SAM)			**Level F**
Scanning Acoustic Microscopy (SAM) (Appendix C.6)	As specified	As specified	
Other			**Level G**
Other test/inspections	As specified	As specified	

2.2.4 Electronic Part's Verification tests must include the following along with AS6081 Level A:

Non-Destructive test:

- Review of data deliverables.
- Inspection of the incoming packaging.
- Verification of the component markings.
- Visual inspection, under microscope, of component leads or Ball Grid Arrays.
- Visual inspection, under microscope, of component surfaces.
- Package dimensions & pin count.
- Solvent test for evidence of Remarking and Resurfacing.
- X-Ray of sample parts to ensure consistent die & bond wire pattern exists.
- XRF analysis from each different date and/or lot code to ensure lead finish is as per manufacturers' requirements.

Destructive Test

- Solderability test performed on one part from each different date and/or lot code in accordance with J-STD-002.
- De-capsulation of one part from each different date and/or lot code.

2.2.5 Any additional testing will be defined by GE VERNOVA at time of order placement and be detailed in the Purchase Order.

2.2.6 The results from the verification tests, including any test & verification reports from independent test houses, shall accompany the parts when delivered to GE VERNOVA.

2.2.7 Determination of risk for suspect counterfeit based on results from the verification tests based on assessments of indicators. The Table 2 in Reference contains an overview of possible indicators that may point to material being counterfeit. Using assigned significance, a threshold for determination of risk of material being counterfeit.

- One Major indicator

- Three or more Moderate indicators
- Two or more Moderate and Two or more Minor indicators.

2.3 Inspections and record retention

2.3.1 Inspection shall be performed by personnel trained in the identification and detection of counterfeit components.

2.3.2 Records of such training shall be documented and available for inspection by representatives of GE VERNOVA or customers of GE VERNOVA.

2.3.3 A record of all the inspection undertaken by the vendor shall be recorded using GE EC form 7.4.3-EC-F002 or equivalent form approved by GE VERNOVA

2.3.4 The supplier shall retain all records for a period of not less than 10 years from acceptance of components. Records may be periodically subject to review/audit by GE VERNOVA personnel.

2.3.5 GE VERNOVA, their customer, and regulatory authorities have the right of access to all facilities involved in the order and to all applicable records.

2.4 Delivery Documentation

Each delivery to GE VERNOVA will be accompanied by a Vendor Certificate of Conformance detailing:

- GE VERNOVA Internal Part number
- GE VERNOVA Purchase Order number
- Original Component Manufacturers company name
- Original Component Manufacturers Part Number
- Date Code of parts
- Lot code of parts
- Quantity delivered

In addition, each delivery shall also be accompanied by:

- Completed vendor inspection record

AND either

- Original Component Manufacturers' Certificate of Conformance along with Full Supply Chain History

OR

- Verification test results (as applicable), along with any de-capsulated parts

2.5 Packaging

2.5.1 For Electronic Parts, all packing materials shall be either conductive or antistatic, including tubes, trays, reels, bags and fillers.

2.5.2 For Electronic parts, handling, storing, re-baking, re-bagging, packaging and shipping of moisture/reflow sensitive devices shall be compliant to J-STD-033.

2.5.3 Other packaging requirement shall meet or exceed industry standard

2.6 Acceptance

2.6.1 All components ordered within the purchase order shall be subject to stringent counterfeit inspection procedures by GE VERNOVA including, where necessary, independent verification.

2.6.2 Where such components are deemed as counterfeit by GE VERNOVA, the Supplier will be duly notified with images, where possible, and the affected components will be returned to the Supplier or destroyed at GE VERNOVA's stated site.

2.6.3 Furthermore, the vendor hereby warrants that they have appropriate process to ensure that all components returned as counterfeit will not re-enter the supply chain.

Note: GE VERNOVA also reserves the right to remove the vendor from its approved sources of supply listing and to notify other companies within the General Electric Corporation when we have a verified counterfeit part.

2.7 Corrective Actions

2.7.1 Where a delivery is deemed to be suspect/counterfeit and the vendor has been duly notified, a Supplier Corrective Action Request will be issued to the vendor.

The vendor must investigate and respond to the Corrective Action Request. The response also includes a root cause analysis along with corrective and preventive actions (including containment of the counterfeit part).

2.8 Quality Records (if applicable)

The following records produced by this procedure are considered Quality Records and maintained and controlled according to the requirements in QME-10 - Supplier Quality requirement unless otherwise indicated:

- Training Record
- Delivery Documentation
- Counterfeit notification
- Corrective action request
- Certificate of conformance from OCM
- Test report
- QMS document to manage counterfeit and suspect part
- Quality certification (e.g.: ISO 9001, AS9100)

3.0 Definitions, Acronyms and References

References:
QME-10
EC-SRC-0009
AS6081

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Table 2

Test Type	Counterfeit Indicator	Strength of Indicator
External Package Inspection	Erroneous OM Logo on external packaging	Major
External Package Inspection	Wrong part number on external packaging	Moderate
External Package Inspection	Shipping damage to external packaging	Minor
External Package Inspection	Misspelled wording on external packaging	Minor
Internal Package Inspection	Bar code mismatch (scan vs human) on box/tube/tray/reel	Major
Internal Package Inspection	Erroneous OM Logo on box/tube/tray/reel	Major
Internal Package Inspection	Humidity indicator card (HIC does not change with humidity	Major
Internal Package Inspection	Wrong part number on box/tube/tray/reel	Moderate
Internal Package Inspection	Use of non-ESD protected material	Moderate
Internal Package Inspection	Wrong/inconsistent orientation in tube/tray/reel	Moderate
Internal Package Inspection	Inconsistent design of tubes/trays/reels	Moderate
Internal Package Inspection	Incorrect size for tube/tray	Moderate
Internal Package Inspection	Shipping damage to box/tube/tray/reel	Minor
Internal Package Inspection	Misspelled wording on box/tube/tray/reel	Minor
Internal Package Inspection	Wrong quantity notes on box/tube/tray/reel	Minor
Internal Package Inspection	Not in original manufacturer's packaging	Minor
Internal Package Inspection	Not in a sealed moisture barrier bag	Minor
Documentation Inspection	Erroneous OM Logo on documents	Major
Documentation Inspection	Mismatch in part number or lot/DC in documentation	Moderate
Documentation Inspection	Evidence of tampering in documentation	Moderate
Documentation Inspection	Misspelled wording in documentation	Minor
Documentation Inspection	Mismatch in part quantity in documentation	Minor
Part Marking / ID Inspection	Impossible lot/DC on part or packaging (obsolete)	Major
Part Marking / ID Inspection	Inconsistent part indentation (pin 1, etc.), top or bottom	Major
Part Marking / ID Inspection	Inconsistent country of origin information	Major
Part Marking / ID Inspection	Incorrect/erroneous manufacturer logo	Major
Part Marking / ID Inspection	Three or more date codes or lots in the same box/tube/tray/reel	Moderate
Part Marking / ID Inspection	Marking on part does not match documentation or packaging	Moderate

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Test Type	Counterfeit Indicator	Strength of Indicator
Part Marking / ID Inspection	Lot/DC on part does not match documentation or packaging	Moderate
Part Marking / ID Inspection	Texture within part indentations	Minor
Part Marking / ID Inspection	Misaligned markings on parts	Minor
Part Marking / ID Inspection	Inconsistent laser etch depth/width	Minor
Part Marking / ID Inspection	Part markings are poor quality	Minor
Part Surface Inspection	Heat stress (bulges or blisters) on Part	Major
Part Surface Inspection	Ghosted markings visible on part surface	Major
Part Surface Inspection	Sanding visible across part surface	Major
Part Surface Inspection	Internal die or wire bonds exposed to surface of part	Major
Part Surface Inspection	Evidence of micro blasting	Major
Part Surface Inspection	Evidence of flat lapping	Major
Part Surface Inspection	Major mechanical damage (chips, scratches, etc.)	Moderate
Part Surface Inspection	Inconsistent texture or color on parts in same lot/DC	Moderate
Part Surface Inspection	Superficial scratches or chips on part	Minor
Part Surface Inspection	Suspicious texture or color on part	Minor
Part Surface Inspection	Suspicious laser markings	Minor
Part Surface Inspection	Chemical residue or other contamination on part	Minor
Physical Dimensions	Package dimensions fail specifications	Major
Physical Dimensions	Pin count is incorrect	Major
Lead / Solder Ball Inspection	Replated part leads (no tooling marks)	Major
Lead / Solder Ball Inspection	Reattached leads on part	Major
Lead / Solder Ball Inspection	Wrong solder ball size	Moderate
Lead / Solder Ball Inspection	Excessive scratches or scrapes on leads	Moderate
Lead / Solder Ball Inspection	Missing leads/balls	Moderate
Lead / Solder Ball Inspection	Solder splash on leads/balls	Moderate
Lead / Solder Ball Inspection	Evidence of micro blasting	Moderate
Lead / Solder Ball Inspection	Lead design varies on parts in same lot/DC	Moderate
Lead / Solder Ball Inspection	Bent leads on part	Minor
Lead / Solder Ball Inspection	Deformed leads/balls	Minor
Lead / Solder Ball Inspection	No exposed copper on end of leads	Minor
Lead / Solder Ball Inspection	Oxidized/corroded leads/balls	Minor
Marking Permanency	Surface coating is removed by MS/alcohol	Major

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Test Type	Counterfeit Indicator	Strength of Indicator
Marking Permanency	Hidden "ghosted" markings uncovered by MS/alcohol	Major
Marking Permanency	Internal die or wire bonds exposed by MS/alcohol	Major
Marking Permanency	Sanding underneath surface uncovered by MS/alcohol	Major
Marking Permanency	Ink marking is removed by MS/alcohol	Moderate
Surface Finish Permanency	Surface coating is removed by acetone	Major
Surface Finish Permanency	Hidden "ghosted" markings uncovered by acetone	Major
Surface Finish Permanency	Internal die or wire bonds exposed by acetone	Major
Surface Finish Permanency	Sanding underneath surface uncovered by acetone	Major
Surface Finish Permanency	Surface coating is removed by aggressive solvents	Major
Surface Finish Permanency	Hidden "ghosted" markings uncovered by aggressive solvents	Major
Surface Finish Permanency	Internal die or wire bonds exposed by aggressive solvents	Major
Surface Finish Permanency	Sanding underneath surface uncovered by aggressive solvents	Major
Surface Finish Permanency	Ink marking is removed by acetone	Minor
Surface Scrape	Surface coating is removed by a razor knife	Major
Surface Scrape	Sanding underneath surface exposed by razor knife	Major
X-Ray Fluorescence	Incorrect lead plating composition	Moderate
X-Ray Fluorescence	Inconsistent lead plating composition	Minor
Radiological (XRay)	Inconsistent die size or design on parts in same lot/DC	Major
Radiological (XRay)	Cracked or damaged die	Major
Radiological (XRay)	Inconsistent lead frame size or design on parts in same lot/DC	Major
Radiological (XRay)	Damaged or deformed lead frame	Major
Radiological (XRay)	Inconsistent wire bond placement on parts in same lot/DC	Major
Radiological (XRay)	Incorrect wire bond materiel	Major
Radiological (XRay)	Missing wire bonds	Major
Radiological (XRay)	Double ball bonds	Major

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Test Type	Counterfeit Indicator	Strength of Indicator
Radiological (XRay)	Misaligned die	Minor
Radiological (XRay)	Inconsistent wire bond thickness on parts in same lot/DC	Minor
Radiological (XRay)	Inconsistent die/lead frame thickness on parts in same lot/DC	Minor
Scanning Acoustic Microscopy	Hidden "ghosted" markings visible by shallow scan	Major
Scanning Acoustic Microscopy	Inconsistent die size or design on parts in same lot/DC	Major
Scanning Acoustic Microscopy	Inconsistent lead frame size or design on parts in same lot/DC	Major
Scanning Acoustic Microscopy	Die delamination visible with CSAM scan	Minor
Decapsulation	Inconsistent die size or design on parts in same lot/DC	Major
Decapsulation	Cracked or damaged die	Major
Decapsulation	Wrong OM or logo	Major
Decapsulation	Incorrect wire bond materiel	Major
Decapsulation	Inconsistent OM or logo on parts in same lot/DC	Major
Decapsulation	Inconsistent part number on parts in same lot/DC	Major
Decapsulation	Inconsistent die design on parts in same lot/DC	Major
Decapsulation	Inconsistent lead frame design on parts in same lot/DC	Major
Decapsulation	Impossible date code (die year after part DC)	Major
Decapsulation	Misaligned die	Minor
Decapsulation	Poor quality (e.g., traces, spacing, contamination, etc.)	Minor
Decapsulation	Mismatched part number	Minor
Decapsulation	Part is more difficult to decap compared to known good	Minor
Electrical Test	One-time programmable parts can't be programmed	Major
Electrical Test	Code/programming left over in parts	Major
Electrical Test	Electrical failures are gross (wrong/damaged)	Major
Electrical Test	25% or higher electrical failure rate	Moderate
Electrical Test	10% or higher electrical failure rate	Minor
Electrical Test	5% or higher electrical failure rate	Minor
Electrical Test	Electrical failures are marginal (stress)	Minor
Electrical Test	Non-traditional electrical test variation	Minor

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Test Type	Counterfeit Indicator	Strength of Indicator
Known Good Part Comparison	Unmatched pin 1 indicator	Moderate
Known Good Part Comparison	Unmatched dimple placement	Moderate
Known Good Part Comparison	Unmatched font or lot format	Moderate
Known Good Part Comparison	Unmatched lead design	Moderate
Known Good Part Comparison	Unmatched lead frame	Minor
Known Good Part Comparison	Unmatched die markings	Minor
OM Support	Component manufacturer states parts are likely counterfeit	Major
OM Support	Component manufacturer states parts are possibly counterfeit	Moderate

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4.0 Document Revisions and Approvals

The following chart lists the revisions made to this document tracked by version. Use this to describe the changes and additions each time this document is re-published. The description should include as many details of the changes as possible.

Records of Reviewers and Approvers may be found within the DMS (Document Management System).

Version	Section Modified and Revision Description	Date	Author
3.0	Update Energy Connections to VERNOVA	01/31/2020	Charles Danner
4.0	VERNOVA alignment with AS6081	01/31/2022	Charles Danner
5.0	Updated EC-SRC-0002 Reference to QME-10 Supplier Quality Requirements.	04/11/2022	Charles Danner
6.0	Update of Preferred GE Independent Distributors	04/30/2023	Charles Danner
7.0	Update of GE POWER CONVERSIONS.	12/01/2024	Charles Danner

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