TECHNICAL REPORT

TB-0003	
Issued 2009-02	

Counterfeit Parts & Materials Risk Mitigation

NOTICE

This document has been taken directly from the original TechAmerica document and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE Technical Standards. The release of this document is intended to replace the original with the SAE International document. Any numbers established by the original document remain unchanged.

The original document was adopted as an SAE publication under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of specifications and standards. TSB rules provide for (a) the publication of portions of unrevised specifications and standards without consensus voting at the SAE committee level, and (b) the use of the existing specification or standard format.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/TB0003

TB-0003

TechAmerica Engineering Bulletin

Counterfeit Parts & Materials Risk Mitigation

TB-0003

February 2009

TechAmerica
WHERE THE FUTURE BEGINS
THE ASSOCIATION OF COMPANIES DRIVING INNOVATION WORLDWIDE

NOTICE

TechAmerica Engineering Standards and Publications are designed to serve the public interest by eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchasers in selecting and obtaining with minimum delay the proper product for their particular needs. Existence of such Standards and Publications shall not in any respect preclude any member or nonmember of TechAmerica from manufacturing or selling products not conforming to such Standards and Publications, nor shall the existence of such Standards and Publications preclude their voluntary use by those other than TechAmerica members, whether the standard is to be used either domestically or internationally.

Standards and Publications are adopted by TechAmerica in accordance with the American National Standards Institute (ANSI) patent policy. By such action, TechAmerica does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the Standard or Publication.

Technical Publications are distinguished from TechAmerica Standards in that they contain a compilation of engineering data or information useful to the technical community and represent approaches to good engineering practices that are suggested by the formulating committee.

This Bulletin is not intended to preclude or discourage other approaches that similarly represent good engineering practice, or that may be acceptable to, or have been accepted by, appropriate bodies. Parties who wish to bring other approaches to the attention of the formulating committee to be considered for inclusion in future revisions of this publication are encouraged to do so. It is the intention of the formulating committee to revise and update this publication from time to time as may be occasioned by changes in technology, industry practice, or government regulations, or for other appropriate reasons.

(Formulated under the cognizance of the TechAmerica G-12 Counterfeit Task Group.)

Published by

© 2009 TechAmerica
Standards & Technology Department
601 Pennsylvania Ave., NW
North Building, Suite 600
Washington, DC 20004-2650

TechAmerica

Counterfeit Parts & Materials Risk Mitigation

TB-0003

Revision	Description of change	Date
-	Initial Release	Feb 2009

Contents

Forward – G-12 Guidelines

A counterfeit item is one whose identity or pedigree has been deliberately altered or misrepresented by its supplier.

Counterfeiting of parts and materials in the electronic business segment is growing at an alarming rate. Since Julius Caesar hung the "caveat emptor" in the ancient Roman market place, it has never been more important for the "buyer to beware." In Roman times it was noticed that all sellers "exaggerate," and that buyers must check to be sure of the product before they buy to protect themselves. So too today's buyers must protect themselves before they buy. It is impossible to fix all of the sellers in the world and try to stop the misrepresentation of product; therefore we must fix how we buy and what we buy.

The G-12 Counterfeit Task Group has unanimously agreed that:

- The only control or safeguard to protect your Program from today's sophisticated counterfeiters is to **only** procure from the Original Equipment Manufacturer (OEM) that makes and warranties the part or material, or their designated franchisees. All other procurement approaches offer significant risk to the Program.
- Any part or material that has been out of the OEM's authorized supply chain has some risk of not fulfilling its intended mission objectives.

1 Scope

This Technical Bulletin covers the following areas of concern.

Prevention:

- Actions recommended for procuring parts and materials with a full warranty.
- Actions recommended for minimizing risks and protecting your Program from counterfeiting.
- Actions recommended when buying from a non-authorized supplier.

Detection:

- Actions recommended when procuring parts from an unauthorized supplier or otherwise suspect that a part or material at risk of being counterfeit has been procured.

Risk Mitigation

- Actions recommended when no reasonable alternatives exist (e.g., a redesign is required, an unacceptable schedule delay will result, the program or customer cannot bear the additional cost) and the decision has been made to procure from a non-authorized supplier.

2 Definitions

Identity: Original manufacturer, part number, date code, lot number, testing, inspection, documentation, or warranty, etc.

Pedigree: Origin, ownership history, storage, handling, physical condition, previous use, etc

Program: The entity or function that directs the requirement for, and use of, the item being procured.

OEM: Original Equipment Manufacturer, also sometimes call Original Component Manufacturer. The manufacturer of the part or material

Designated Franchisee: A supplier authorized by the OEM to resell the OEM's product with the OEM's full warranty. A designated franchisee operates under the oversight of the OEM. Also may be referred to as an **Authorized Distributor**.

Non-franchised / non-authorized supplier: a supplier not approved or under the oversight of the part's or material's OEM. A supplier that cannot offer an item with the full manufacturer's warranty.

3 Prevention

Procuring Parts and Materials

Counterfeit electronic components can jeopardize the performance and reliability of electronics.

In today's supply chain environment, electronic equipment manufacturers and Government users must be vigilant in order to avoid counterfeit electronic components. The vast majority of counterfeit cases reported are associated with purchases through Independent Distributors. Analysis of recent problems, report that counterfeit components can change hands several times while within the independent distribution supply chain, and are of unknown origin.

The most effective approach to avoiding counterfeit electronic components is to purchase product directly from the Original Equipment Manufacturer, or from a distributor, reseller, or aftermarket supplier who is franchised or authorized by the original manufacturer.

The OEM should be solicited by the using contractor because there is less risk, and they manufacture, sell, and warranty the requested part or material. An Original Equipment Manufacturer may franchise the sales of its products. It is reasonable to acquire OEM products from the OEM, or the OEM's franchisee. It is reasonable to request quotations from multiple franchisees of the OEM, and select the one best able to meet the Program's cost and schedule needs.

It is risky to request a quotation from a non-franchised (non-authorized) supplier. Assuring that the quotation is meaningful, that the non-franchised supplier is capable of supplying the authentic, reliable goods or services requested, and that the non-franchised supplier has delivered the authentic product, may result in excessive costs far exceeding those incurred in using the OEM or their authorized suppliers. All of these assurance assessment costs should be considered a part of the non-franchised, non-authorized supplier's quotation price.

It is *not advisable* to acquire an item from a non-franchised supplier because of the risk of introducing a counterfeit part into the product delivered to the customer.

Assessment of Electronic Part Distributors

Electronic part distributors are not all the same. Their actions or inactions can affect the cost, quality, reliability, and lead time of the products they supply. All suppliers of electronic parts and materials, authorized or otherwise, need to be assessed before their selection. A distributor assessment process needs to cover the following categories: delivery performance; technical product knowledge and technical production/test equipment, quality control; process control; handling, storage, and shipping control; part traceability; corrective and preventive action; and customer support and service.

The life-cycle cost of the item purchased should include the cost of assessing the supplier and the item. The buyer should account for this cost when comparing bids since the cost of these assessments may equal or exceed the item's cost.

Use of a non-authorized supplier

It is understood that Program requirements (e.g., obsolescence, schedule) may make the use of the OEM or an authorized distributor impossible. A substantial number of products required to produce and support defense electronics are no longer available from the original equipment manufacturer, or through franchised / authorized suppliers. Independent distributors are often used to fill this gap. While various mitigation methods can reduce the risk of receiving counterfeit parts from Independent Distributors, there is no failsafe method. A suite of inspections and tests are necessary to detect counterfeits and eliminate infant mortality defects, and to establish a high level of confidence in field performance and reliability. Acquisition traceability mechanisms and product assurance controls for product acquired from Independent Distributors must improve.

If an unauthorized supplier (including a broker) must be used, it is strongly advised to notify the customer, and the following guidelines are recommended to minimize the risk of obtaining counterfeit part or materials.

- Know your source
  a. Use sources with an established, good history with your firm or one that can be independently verified.
  b. Check their stability (overall business and staff) and financial condition.
  c. Check for GIDEPs citing them as the source of counterfeit or defective parts.
  d. Survey them. Look at their:
     i. quality systems
     ii. procurement system
     iii. sources
     iv. inventory/storage facility
     v. inspection and test facility
     vi. ESD and handling controls
     vii. inspection and test plans
     viii. test equipment capability, calibration, etc.
     ix. inspection and test personnel
     x. outside sources used for testing, DPA, etc. Verify and approve these.
  e. Consider the supplier's plans for handling, inspection, test and packaging of the part or material procured.
  f. How did/will the supplier verify the item's pedigree?

  If the supplier satisfies these requirements, perform the following part/program specific assessments.

- Assess risk of use
  a. What is effect on mission, schedule, cost of a counterfeit part going undetected?

   b. Based on the item's characteristics (ability to inspect, test, etc., including cost and destructive sample available) is it likely that a counterfeit part can be detected?
   c. At what stage in procurement-inspection-stock-use cycle will a counterfeit likely be detected?
- Develop an inspection and test plan
   a. Risk / Cost / Schedule driven
   b. Where/who can do necessary tests and inspections?
   c. Required equipment, etc. or outside source
   d. Destructive samples required
   e. DPA?
   f. Sample size for testing (100%, Confidence Level, AQL, LTPD, etc.) – risk of failing to detect determines sample size
   g. Is lot definition, homogeneity understood?
   h. Have a plan for what to inspect, test, etc., including criteria for acceptance and rejection
   i. Know characteristics of a good part
   j. Check materials (lead, lead-free, etc.)
- Have a disposition plan
   a. Whom to notify if counterfeit found
   b. What to do with the parts – DON"T RETURN
- Develop a plan to avoid using a non-authorized supplier in the future
   a. Obsolescence management
   b. Inventory control
   c. Material Requirements Planning (MRP)

4 Detection

When a counterfeit part or material is suspected, a disciplined approach is needed to detect a counterfeit or exonerate a good item. Using the proper techniques will protect the Program from the risks associated with using a suspect item. Not using the right methods, or being unwilling to take the necessary time and incur the needed expense, will leave the Program at risk of using a counterfeit part or material that will fail prematurely with unforeseen reliability and liability effects.

Suspected counterfeit electronic parts and some materials should be evaluated using the appropriate evaluation methods from Table 1.

Table 1 — Risk Mitigation Methods

Counterfeit Concern	Detection/Risk Mitigation Methods										
	Visual / Marking Inspec-tion	Verification of Manuf. LDC, SNs, etc.	Mater-ial Analy-sis	Seal Test	Radio-graphic	DPA	Minimal Electrical Test	Full Electri-cal Test (Am-bient)	Full Electrical Test (Hot / Cold Ambient)	Test & Burn-in	Test, Burn-in and QCI
No Die / Non-functional	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Material Content	P	No	Yes	No	No	Yes	No	No	No	No	No
Wrong Die	P	P	No	No	P	Yes	Yes	Yes	Yes	Yes	Yes
Re-used / Repaired / Salvaged	P	No	P	P	P	P	No	No	No	No	No
Scrapped / Reject	P	No	No	P	P	P	P	P	P	Yes	Yes
Mechanical Damage	Yes	No	No	P	P	Yes	P	P	P	P	P
Mis-Handling / Storage	No	No	No	P	No	P	P	Yes	Yes	Yes	Yes
Manufacturer Change	P	P	P	No	P	Yes	P	P	P	P	P
Less Reliable Parts	P	P	P	No	No	P	No	P	P	P	P
Reliability / Quality Issue	No	No	No	No	P	P	No	P	P	Yes	Yes
ESD / EOS Damage	No	No	No	No	No	P	P	P	P	Yes	Yes
Counterfeit with functional die	P	P	P	No	P	P	P	P	Yes	Yes	Yes
Temperature Range Upmarking	No	P	No	No	No	P	No	No	Yes	Yes	Yes

Code:
No = Unlikely to Find
P = Possibly Find
Yes = Probably Find

Shading:
Green = Low Cost / Easily Accomplished
Yellow = Moderate Cost / Some time involved
Red = High Cost / Significant time to accomplish
Dotted Pattern = Will be found at first electrical test

This chart was developed from one created by Mark Marshall of Integra Technologies.

Note: It may require more than one method to evaluate a suspect part or material. Different methods will find different types of counterfeits, though no method or combination is fool-proof and some may yield "false positives." A proper and complete destructive physical analysis (DPA) is the most general technique as can be seen from the above chart, but even this is not a panacea; for example, it may not identify a fraudulently labeled part, e.g. a commercial part relabeled as a military temperature range part.

The evaluation methods used both from Table 1 and other techniques should be selected based on a part's technology, physical and electrical characteristics and the reason for suspicion.

When a counterfeit part or material is confirmed:

a. Segregate the counterfeit item, and it is suggested that the item not be returned to the supply chain.
b. Review the evidence with procurement and investigative organizations.
c. Try to procure the authentic part or material directly from the OEM or their franchised/authorized distributor. (Franchised or authorized distributors may be found by contacting the OEM who manufactures and warranties the parts or materials.) This will help support the Program schedule.
d. Contact GIDEP or follow Program guidelines to report the problem.
e. If no bonafide OEM parts or materials can be procured to support the Program objectives, notify the Program and consider redesigning the system.

To report a problem through the GIDEP system, GIDEP participants should submit a GIDEP report in accordance with GIDEP instructions. Non-participants can contact the GIDEP Help Desk (915-818-3207) for guidance.

5 Risk Mitigation

When no alternatives exist except a full redesign and the Program has directed the use of an item obtained from an unauthorized source, a process should be followed to assess Program requirements and to mitigate some of the risk of the item's use. Since risk mitigation is expensive and time consuming, the Program must determine the amount of risk it can afford to retire, understanding that it is impossible to eliminate all risk of use. As with the detection methods discussed in Section 4, this process will not guarantee an item's suitability for the Program's application, it will only either identify some risks or improve the confidence that the item will fulfill its intended purpose. The same methods identified in Section 3, Table 1, and the techniques outlined in Figure 1 provide guidelines in developing a risk mitigation plan. The item's characteristics (physical, electrical, mechanical, construction, materials, etc.), application (including environmental) and required reliability (expected service life, ability to be replaced after failure, etc.) must all be considered in developing and implementing a plan. Cost, schedule and the risk of both failing to detect a deficiency and in damaging a "good" part are also considerations.

A risk mitigation process should include the following actions:

a. Identify to the Program the risks associated with the item's use, any redundancy factors, and the plan to verify the item's suitability for its intended application. See Section 1, use of a non-authorized supplier, for ideas on what a plan should include.
b. Obtain the Program's (customer's if necessary) approval to proceed with the evaluation plan.
c. Conduct the planned evaluation to mitigate some of the risks.
d. The procurement of a large quantity of parts will be necessary to give any confidence in a lot of parts or materials that is procured from a source other than the manufacturer of the product.
e. A Destructive Physical Analysis (DPA) should be conducted in accordance with MIL-STD-1580 on a random sample with a minimum of a 90% confidence level (i.e. 22 piece sample, C=0) at a program approved laboratory. A sample (22 pieces) should be selected from each lot / date code.
f. The results of all tests, evaluations and investigations should be carefully reviewed to identify any evidence of defects that jeopardize the item's use in its intended application. Any new risks should be reported to the program.