

# DESTRUCTIVE PHYSICAL, FAILURE, AND COUNTERFEIT ANALYSIS OF ELECTRONIC COMPONENTS

## WHAT IS DESTRUCTIVE PHYSICAL ANALYSIS (DPA)?

Destructive Physical Analysis (DPA) is the process of disassembling, testing, and inspecting electronic components to verify the internal design, materials, construction, and workmanship. This process of sample inspection ensures that electronic components are fabricated to the required standards. Destructive Physical Analysis is also used effectively to discover process defects for identification of production lot problems.

The component analysis laboratory at NTS performs major analytical functions, such as Destructive Physical Analysis (DPA), Failure Analysis (FA), Counterfeit Analysis, and material analysis on electronic components.

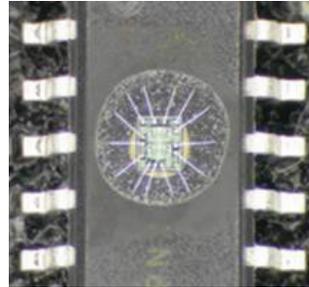
Our DPA techniques are performed in accordance with industry standards and methods used in most military and space program requirements. Solutions for production challenges may be resolved through our failure analysis procedures and verification.

From removal of encapsulant to internal visual inspections after cross section, different types of operations are performed as a part of our Destructive Physical Analysis (DPA) process.

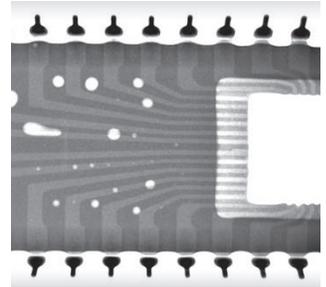
Our standard DPA program includes External Visual Inspection (EVI), Hermeticity Testing, Acoustic Microscopy, Decapsulation/Delidding, Internal Visual Inspection,



All DPA test techniques are performed to industry standards



Decapsulation of IC (Integrated Circuit)



X-Ray identifying defects inside IC

Bond Pull Testing, Die Shear Testing, Scanning Electron Microscopy/Energy Dispersive X-Ray Spectroscopy (SEM/EDS), X-Ray Radiography, X-Ray Fluorescence (XRF), Microsection (cross-section) Analysis, and Optical Microscopy.

DPA is most commonly performed to MIL-STD-1580 using the test methods of:

- MIL-STD-202
- MIL-STD-883
- MIL-STD-750

## COMPLIMENTARY TESTING AND VERIFICATION SERVICES

NTS has over 35 years of experience performing Destructive Physical Analysis and is well versed in DPA procedures. In addition to the sampling of MIL-STD test methods listed above, NTS is capable of performing client specified DPA test flows, either through a client's selection of MIL-STD test procedures or a complete DPA performed to meet a client owned procurement document.

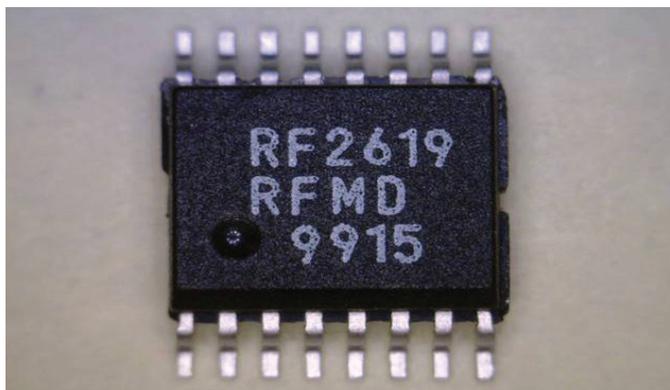
In addition to DPA, Scanning Electronic Microscope (SEM), X-Ray Fluorescence (XRF), Energy Dispersive X-ray Spectrometry (EDS), and C-mode Scanning Acoustic Microscopy (CSAM) are used to perform in-depth failure and materials analysis on any type of electronic component. We also perform electrical test and verification comparing failed electronic components to their known good counterparts.

## COMPLIMENTARY TESTING AND VERIFICATION SERVICES CONTINUED

Our Counterfeit Component Test group includes industry experts and SAE committee chair working to develop the first industry-recognized test method standard to provide uniform requirements, practices and methods for testing electronic parts to mitigate the risks of receiving or using suspect counterfeit electronic parts.

## MOST COMMONLY REQUESTED DESTRUCTIVE PHYSICAL ANALYSIS (DPA) AND FAILURE ANALYSIS (FA) TESTS:

- Ball Shear Strength
- Bond Strength
- DC I.V. Curve Tracing
- Die Shear Strength
- Digital Microscopy
- External Visual Inspection
- Fluorescence Microscopy
- Glassivation Layer Integrity
- Sub-Micron Real Time X-ray
- Internal Visual Inspection
- Cross-Sectioning
- Particle Impact Noise Detection
- Scanning Electron Microscopy (SEM) Inspection
- SEM Metallization Inspection
- Solder Reflow/Moisture Sensitivity Testing
- Glassivation Thickness



Verification of labeling to identify counterfeit components



NTS test experts are well versed in all DPA procedures

## MOST COMMONLY REQUESTED DESTRUCTIVE PHYSICAL ANALYSIS (DPA) AND FAILURE ANALYSIS (FA) TESTS CONTINUED:

- Metallization Thickness
- Hermeticity Testing
- SEM, XRF, and FTIR Elemental Analysis
- Scanning Acoustic Microscopy (C Mode)
- Ion Milling
- Acid De-encapsulation
- Sample De-lidding
- Computer Tomography (CT) X-Ray (3D X-Ray)
- FT-IR

## ABOUT NTS

Every hour of every day, NTS is fully invested in helping you build better, stronger, safer, more reliable products, and bring those products to market quickly and efficiently. Since conducting our first rounds of tests in 1961, NTS has become one of the largest commercial test laboratory networks in North America.

Our test, inspection and certification services cover environmental, dynamics, EMC, materials, ballistics and much more. NTS engineers have exceptional knowledge of all test and conformity requirements. Client partners in Aerospace, Defense, Telecom and Energy rely on NTS to make sure they're putting their best products forward, and so can you.

