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ELECTRONICS INDUSTRIES®

IPC-A-600G

Amendment 1

Acceptability of Printed Boards

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January 2008

A standard developed by IPC

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In May 1995 the IPC's Technical Activities Executive Committee (TAEC) adopted Principles of Standardization as a guiding principle of IPC's standardization efforts.

Standards Should:

- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

Standards Should Not:

- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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Acceptability of Printed Boards

Amendment 1

FOREWORD

This amendment provides updated acceptance criteria for measles within printed boards. The measle acceptance criterion within this Amendment matches that within IPC-6012B Amendment 2, IPC-A-610D Amendment 1, and IPC-J-STD-001D Amendment 1. The criteria represents consensus among the four respective task groups for these standards obtained at the IPC Midwest 2007 standards development meetings, as a resolution to conflicts in the acceptance criteria for measles that have been present in the four standards since early 2005.

2.3 BASE MATERIAL SUBSURFACE - INTRODUCTION

Append the following to the end of Section 2.3, Base Material Subsurface - Introduction:

Brief summary of the Third IPC Blue Ribbon Committee on Measles

In 2004, the issue of printed board laminate degradation caused by internal Conductive Anodic Filament (CAF) growth came to the forefront of discussions among the IPC Printed Board (PB) assembly standards groups (including the 7-31b IPC-A-610 and 5-22a National Standard for Soldering task groups.) It was observed that circuit density, operating speed, band pass as well as reduced operating voltage had impacted the ability of circuits to operate under conditions supporting dendrite or CAF development.

With the proliferation of finer line conductors and reduced spacing in current designs, discussions within the assembly standards groups questioned the role of measles within PB laminate materials as a potential catalyst for CAF growth.

For years, IPC standards for electronic production contained no restrictions for the occurrence of measles in printed boards and/or assemblies. Theoretically, measles could be continuous between conductors and could exist throughout the PB. It was noted that this allowance was based on studies conducted nearly 30 years ago based on circuit designs from that time period. It was recognized that a need existed to reconsider the measles requirements for today's production designs and product environment.

In the interim, as a means to call attention to this potential problem, IPC assembly documents were changed to

include pass/fail (defect) criteria for Class 3 assemblies that exhibited the visual appearance of measles.

The new measles criteria created in the assembly documents defined requirements that were stricter than those given in the PB documents unless the additional IPC-6012, Class 3A (Military and Aerospace) requirements were considered. IPC-6012, Class 3A does not allow measles in bare boards for these industry segments, however Class 3 printed boards produced in accordance with 6012, which exhibited measles, were no longer acceptable for use in the assembly documents for Class 3 in general. This requirement conflict was brought to the attention of the IPC Technical Activities Executive Committee (TAEC) and that body directed both groups to work together to come to some resolution, based on test data that would bring the documents into agreement on the acceptance criteria.

The leadership of the PB standards committees formed a new Blue Ribbon Committee on Measles and designed and completed a test to determine if measles contributed to CAF failures in actual end product. This test protocol was completed in late 2006 and presented to the PB standards committees at IPC Printed Circuits Expo/APEX 2007. There was conclusive evidence within the test that measles did not contribute to CAF growth; nor did the presence of measles promote CAF failures in the end product that exhibited CAF.

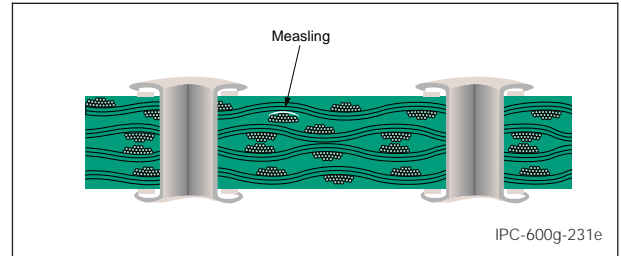
This presentation was then given to the assembly standards groups for their consideration. The request was made that the requirements in the bare printed board and assembly documents be changed to track with each other.

The leadership of the assembly standards groups concurred that the industry now had test data that addressed their original concerns regarding the potential of measles to promote CAF failures. They also agreed that the documents should be amended to eliminate the conflicting measles requirements. The groups jointly drafted the words, comments, and instructions for all documents regarding measles and these were presented to the committee membership at the 2007 IPC Midwest Conference. Copies of the test protocol summary are available through the IPC.

2.3 BASE MATERIAL SUBSURFACE

2.3.1 Measling *(Replace the subsection as follows:)*

Measling: Measling manifests itself in the form of discrete white squares or “crosses” below the surface of the base material, and is usually related to thermally induced stress. Measles are subsurface phenomena that have been found in new laminated materials and in every board type made from woven fiber reinforced laminates at one time or another. Since measles are strictly subsurface phenomena and occur as a separation of fiber bundles at fiber bundle intersections, their apparent positions relative to surface conductors have no significance.



Note: This graphic is for illustrative purposes only and does not require a microsection evaluation.



Target – Class 1,2,3

- No evidence of measling.

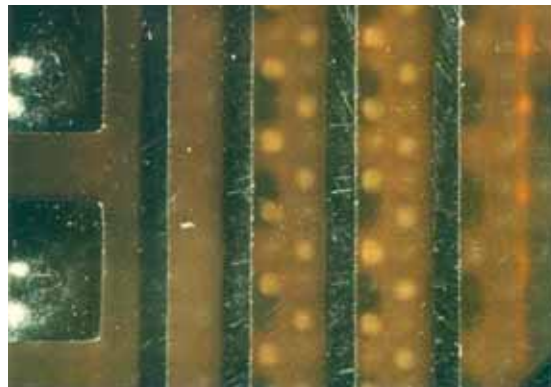
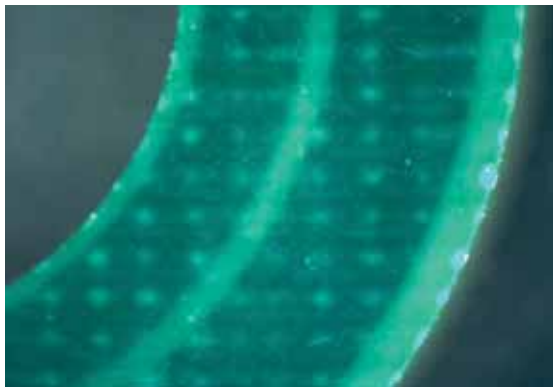
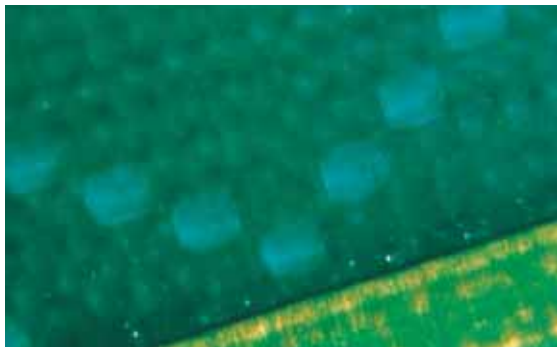
Acceptable – Class 1, 2

- The criteria for measling is that the printed board is functional.

Process Indicator – Class 3

- Measled areas in laminate substrates exceed 50% of the physical spacing between non-common conductors.

Note: Measling is an internal condition which may not propagate as a result of thermal testing that replicates future assembly processes and has not been conclusively shown to be a catalyst for CAF growth. Delamination is an internal condition which may propagate under thermal stress and may be a catalyst for CAF growth. The IPC-9691 user's guide for CAF resistance testing and IPC-TM-650, Method 2.6.25, provide additional information for determining laminate performance regarding CAF growth. Users who wish to incorporate additional criteria for measle conditions may consider incorporating the provisions of IPC-6012, Class 3A which does not allow measles.



Note: Measles are observed from the surface. Cross-sections are for illustration purposes only.