This is a preview of "IPC SM-840E-2010". Click here to purchase the full version from the ANSI store.

IPC-SM-840E

Qualification and Performance Specification of Permanent Solder Mask and Flexible Cover Materials

Developed by the Solder Mask Performance Task Group (5-33B) of the Cleaning and Coating Committee (5-30) and the Covercoat Materials Task Group (D-13B) of the Flexible Circuits Committee (D-10) of IPC

Supersedes:
IPC-SM-840D - April 2007
IPC-SM-840C - Amendment 1 - June 2000
IPC-SM-840C - January 1995
IPC-SM-840B - May 1988
IPC-SM-840A - July 1983
IPC-SM-840 - November 1977

Users of this publication are encouraged to participate in the development of future revisions.

Contact:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

This is a preview of "IPC SM-840E-2010". Click here to purchase the full version from the ANSI store.

Table of Contents

1 SCOPE AND DESIGNATION 1
1.1 Scope 1
1.2 Purpose 1
1.3 Classes 1
1.4 Presentation 2
1.5 Terms and Definitions 2
1.5.1 As Agreed Between User and Supplier (AABUS) 2
1.5.2 Blistering 2
1.5.3 Chalking (Cured Solder Mask or Cover Material) 2
1.5.4 Color Change (Cured Solder Mask or Cover Material) 2
1.5.5 CoC 2
1.5.6 Covercoat 2
1.5.7 Coverfilm 2
1.5.8 Cover Material 2
1.5.9 Crazing (Conformal or Solder Mask or Cover Material) 2
1.5.10 Delamination (Cured Solder Mask or Cover Material) 2
1.5.11 FTIR 2
1.5.12 Liquefaction (Cured Solder Mask or Cover Material) 3
1.5.13 Peeling (Cured Solder Mask) 3
1.5.14 SAC 305 3
1.5.15 Softening (Cured Solder Mask or Cover Material) 3
1.5.16 Solder Mask 3
1.5.17 Swelling (Cured Solder Mask or Cover Material) 3
1.5.18 Tackiness (Solder Mask or Cover Material) 3
1.5.19 Wicking (Solder Mask or Covercoat) 3
1.6 Revision Level Changes 3

2 APPLICABLE DOCUMENTS 3
2.1 IPC 3
2.2 Underwriters Laboratories 4
2.3 ASTM 4
2.4 Precedence of Documents 4

3 REQUIREMENTS 4
3.1 Qualification/Conformance 4
3.1.1 Material Qualification and Conformance 4
3.1.2 Printed Board Process Qualification and Assessment 5
3.1.3 Requalification 5
3.2 Materials 5
3.2.1 Formulation Change 5
3.2.2 Compatibility 5
3.2.3 Shelf Life 7
3.2.4 Color 7
3.2.5 Cure 7
3.2.6 Non-Nutrient 7
3.3 Visual Requirements 7
3.3.1 Appearance 7
3.3.2 Discoloration (Metallic Surfaces) 7
3.3.3 Discoloration (Solder Mask or Cover Material) 7
3.4 Dimensional Requirements 7
3.4.1 Solder Mask or Cover Material Thickness 7
3.5 Physical Requirements 7
3.5.1 Pencil Hardness 7
3.5.2 Adhesion 7
3.5.3 Machinability 8
3.5.4 Flexibility 9
3.6 Chemical Requirements 9
3.6.1 Resistance to Fabrication Solvents, Cleaning Agents and Fluxes 9
3.6.2 Hydrolytic Stability 9
3.6.3 Flammability 9
3.7 Soldering Requirements 9
3.7.1 Solderability 9
3.7.2 Resistance to Tin-Lead Solder 9
3.7.3 Resistance to Lead Free Solder 10
3.8 Electrical Requirements 10
3.8.1 Dielectric Strength 10
3.8.2 Insulation Resistance 10
3.9 Environmental Requirements 10
3.9.1 Moisture and Insulation Resistance 10
3.9.2 Electrochemical Migration 10
3.9.3 Thermal Shock 10

4 QUALITY ASSURANCE PROVISIONS 11
4.1 Responsibility for Testing/Inspection 11
4.1.1 Initial Qualification Testing 11
4.1.2 Test or Inspection Facilities 11
4.2 Qualification Inspection 11
4.2.1 Sample Size 11
4.2.2 Inspection Routine 11
4.2.3 Failures 11
4.3 Quality Conformance Testing/Inspection 11
4.3.1 Testing/Inspection of Product for Delivery 11
4.4 Preparation of Specimens for Test 12
4.4.1 Standard Laboratory Conditions 12
4.4.2 Specimen Selection 13
4.4.3 Coating 13
4.4.4 Number 14

This is a preview of "IPC SM-840E-2010". Click here to purchase the full version from the ANSI store.

5 PREPARATION OF SOLDER MASK OR COVER MATERIAL FOR DELIVERY 15

5.1 Preservation, Packaging and Packing 15

6 NOTES 15

6.1 Specifying Solder Mask or Cover Material on Printed Boards 15

6.2 Class FT/FH Test Methods 15

6.3 Special Requirements 15

Figures

Figure 4–1 IPC-B-25A (Note: No solder mask or cover material shall be applied to contact fingers).........14

Figure 4–2 IPC-2221 Test Coupon E Layer 1 (“Y” Configuration)..14

Tables

Table 3–1 Requirements of Qualification 6

Table 3–2 Adhesion to Rigid Printed Boards (IPC-B-25A Test Board and/or Production Printed Board) 8

Table 3–3 Moisture & Insulation Resistance 10

Table 3–4 Electrochemical Migration 10

Table 3–5 Thermal Shock Conditions 11

Table 4–1 Sample Requirements/Suggested Test Sequence for Table 3–1, Column A IPC-B-25A Standard Test Boards 12

Table 4–2 Sample Requirements/Suggested Test Sequence for Table 3–1, Column B IPC-B-25A Boards – Production Process or Conformance Coupons Or Production Printed Boards 13

This is a preview of "IPC SM-840E-2010". Click here to purchase the full version from the ANSI store.

Qualification and Performance Specification of Permanent Solder Mask and Flexible Cover Materials

1 SCOPE AND DESIGNATION

1.1 Scope This specification **shall** define the criteria for and method of obtaining the maximum information about and confidence in cured permanent solder mask and cover material under evaluation with the minimum of test redundancy.

This specification **shall** establish the requirements for:

- The evaluation of solder mask and cover materials
- The conformance of solder mask and cover material properties
- The qualification of the solder mask and cover material via the appropriate test substrate
- The qualification assessment of the solder mask and cover material in conjunction with the production printed board process

1.2 Purpose This specification **shall** establish the requirements, based on applicable test methods and conditions, for the evaluation of a solder mask and cover material and for the determination of the acceptability of use on a printed board. These same requirements **shall** also be used to qualify a printed board production process based on conformance criteria defined by the reliability requirements of the end use environment. Acceptability and/or verification criteria of the production printed board **shall** be determined in accordance with the applicable performance requirements (e.g., IPC-6012, IPC-6013, IPC-6018, etc.).

The solder mask materials described herein, when applied to the printed board substrate are intended to prevent and/or minimize the formation and adherence of solder balls, solder bridging, solder build-up and physical damage to the printed board substrate. The solder mask material **shall** retard electromigration and other forms of detrimental or conductive growth.

The cover materials described herein, when applied to the printed board substrate, **shall** provide a flexible dielectric protective layer over the etched conductors and other conductive features. The cover materials are intended to prevent and/or minimize the formation and adherence of solder balls, solder bridging, solder build-up and physical damage to the printed board substrate. The cover materials **shall** retard electromigration and other forms of detrimental or conductive growth.

NOTE: The determination of compatibility between solder mask and cover materials and post soldering products and processes is beyond the scope of this specification. The use of Test Methods specified herein to determine the compatibility and the requirement to do so **shall** be as agreed between user and supplier (AABUS).

This specification **shall** list the base requirements for solder mask and cover materials and their production processes. The solder mask and cover material **shall** be cured per the manufacturer's recommended process in accordance with those conditions specified for that product. Additional requirements or deviations from these requirements **shall** be AABUS.

1.3 Classes This specification provides four classes of requirements, T, FT, H, and FH to reflect functional performance requirements and testing severity based on industry/end use requirements. Qualification to a particular class **shall not** be extended to cover any other class.

Note: The reference of a single class does not preclude invoking or allowing specific requirements defined in other classes.

T — Telecommunication This includes computers, telecommunication equipment, sophisticated business machines, instruments, and certain non-critical military applications. Solder mask and cover material on printed boards in this class is suitable for high performance commercial and industrial products in which extended performance life is required but for which interrupted service is not life threatening.

H — High Reliability/Military This includes that equipment where continued performance is critical, equipment down-time cannot be tolerated and/or the equipment is a life support item. Solder mask and cover material on printed boards of this class is suitable for applications where high levels of assurance are required and uninterrupted service is essential.

FT — Flexible Printed Board Applications (Telecommunications) This applies to cover materials for flexible printed board applications used in Telecommunications applications.