
British Standard

Sectional specification for capability approval of manufacturers of single- or double-sided printed wiring boards of assessed quality without plated through holes

Spécification intermédiaire pour l'agrément de savoir-faire des fabricants de cartes imprimées
à simple ou à double face de qualité assurée sans trous métallisés

Rahmenspezifikation für die Anerkennung der Fähigkeit für Hersteller von gütebestätigten
Leiterplatten mit Leiterbildern auf einer oder auf beiden Seiten und ohne metallisierte Löcher

Foreword

This revision of BS 9763, which has been prepared under the direction of the Electronic Component Standards Committee, is one of a series of specifications dealing with printed wiring boards of assessed quality. This standard supersedes BS 9763 : 1977, which is withdrawn.

The generic standard, BS 9760, defines the test methods applicable to all types of printed wiring board and capability approval procedures and rules. The specific tests and requirements applicable to different types of printed wiring boards are contained in a series of sectional specifications comprising BS 9761 to BS 9766. These specifications deal both with requirements for capability approval and with those for quality conformance inspection. This particular sectional specification deals with single- and double-sided printed wiring boards without plated through holes (PTHs) and includes tests for capability approval using composite test patterns (CTPs) for which information is given in appendices A to H.

Warning. Some of the test procedures given in this standard require the use of substances that may be injurious to health unless adequate safety precautions are taken. The standard refers only to technical suitability and in no way absolves either the supplier or the user from statutory obligations relating to health and safety at any stage of manufacture or use.

For ease of reference, the test item numbering used in BS 9763 : 1977 has been retained, except for the introduction of the new tests numbered 25 to 31.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Amendment No. 1
published and effective from 15 December 1992
to BS 9763 : 1988

**Sectional specification for capability approval
of manufacturers of single- or double-sided
printed wiring boards of assessed quality without
plated through holes**

Corrections

AMD 7355
December 1992

Front cover

In the title, between 'double-sided' and 'printed', insert 'rigid'.

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December 1992

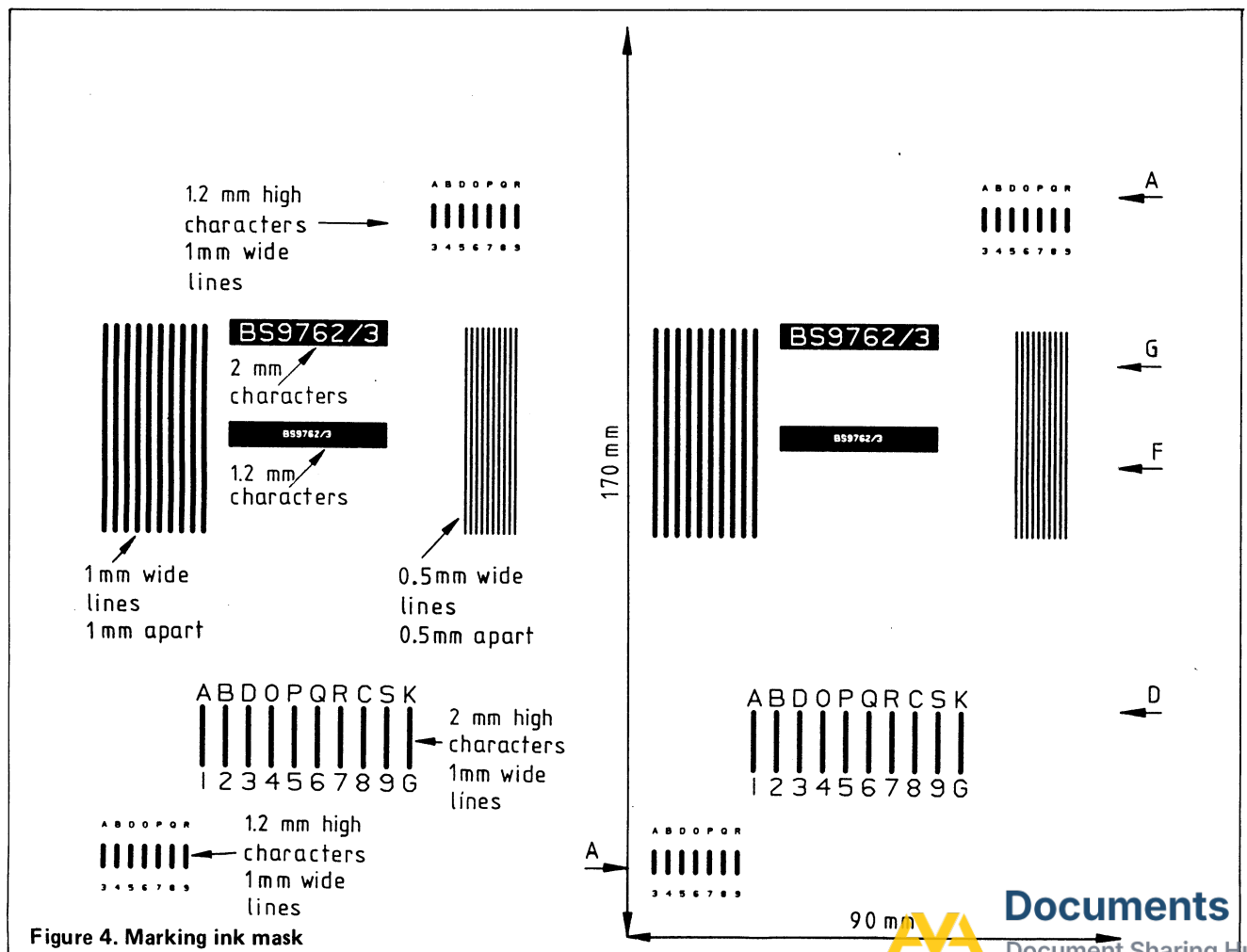
Table 2. Schedule of tests for capability approval for single- and double-sided boards without PTHs

In the inspection characteristics column for item no. 13, line 1, delete 'Pull-out' and substitute 'Pull-off'.

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Figure 4. Marking ink mask

Delete the existing figure and substitute the attached.



Contents

	Page
Foreword	Inside front cover
Committees responsible	Back cover
Specification	
Section one. General	
1.1 Scope	2
1.2 Related documents	2
1.3 Base materials	2
1.4 Customer detail specification	2
1.5 Inspection	2
Section two. Capability approval	
2.1 Description of capability: limits of approval	3
2.2 Demonstration of capability	3
2.3 Capability CTP allocation	3
2.4 Capability approval acceptance levels	4
2.5 Capability approval report	4
2.6 Abstract of description of capability	4
Section three. Quality conformance inspection	
3.1 General	5
3.2 Certified test records	5
Appendices	
A CTP dimensions and finish for single- and double-sided boards without PTHs	15
B Group pattern layout for single- and double-sided boards without PTHs	16
C Detailed dimensions of specimens shown in appendix B	17
D CTP layout	18
E Example of format for abstract of description of capability for inclusion in PD 9002	19
F Format for customer detail specification for single- and double-sided printed wiring boards without PTHs complying with BS 9763	20
G Solder resist and marking ink masks	21
H Test pattern for bonded heat sinks	23
Tables	
1 CTP allocation	4
2 Schedule of tests for capability approval for single- and double-sided boards without PTHs	6
3 Quality conformance inspection: single- and double-sided printed wiring boards without PTHs	13
Figures	
1 CTP for single- and double-sided boards without PTHs	15
2 CTP layout	18
3 Solder resist mask	21
4 Marking ink mask	22
5 Test pattern for bonded heat sinks	23

Section one. General

1.1 Scope

This British Standard specifies requirements for the capability approval of manufacturers of single- and double-sided printed wiring boards without plated through holes (PTHs). It also includes requirements for quality conformance inspection.

The standard includes tests, selected from those described in BS 9760, for use in capability approval and in conjunction with detail specifications.

This standard also includes guidance on the preparation of customer detail specifications.

NOTE. There are no requirements for eyelets, rivets, turrets, etc. The assessment and release of such features should be by separate local agreement between the manufacturer and the customer.

- | | |
|---------|--|
| BS 9764 | Sectional specification for capability approval of manufacturers of single- or double-sided flexible printed wiring boards of assessed quality without plated through holes and with or without rigidizing component materials |
| BS 9765 | Sectional specification for capability approval of manufacturers of double-sided flexible printed wiring boards of assessed quality with through hole connections and with or without rigidizing component materials |
| BS 9766 | Specification for printed circuits of assessed quality: sectional specification for multilayer flexi-rigid printed circuits with through hole connections |
| PD 9002 | BS 9000, BS CECC and IECQ qualified products list |

1.2 Related documents

This British Standard makes reference to the following publications:

- | | |
|---------|--|
| BS 2011 | Basic environmental testing procedures
Part 2.1Ca. Test Ca. Damp heat, steady state |
| BS 4584 | Metal-clad base materials for printed wiring boards
Part 2. Epoxide woven glass fabric copper-clad laminated sheet, general purpose grade: EP-GC-Cu-2
Part 3. Epoxide woven glass fabric, copper-grade laminated sheet, flame retardant grade: EP-GC-Cu-3
Part 9. Flexible copper-clad polyester (PETP) film: PETP-F-Cu-9
Part 10. Flexible copper-clad polyimide film: PI-F-Cu-10 |
| BS 6096 | Marking inks and solder resist coating materials for printed circuits |
| BS 9000 | General requirements for a system for electronic components of assessed quality
Part 1. Specification of basic rules and procedures |
| BS 9760 | Specification for printed circuits of assessed quality: generic data and methods of test: capability approval procedure and rules |
| BS 9761 | Sectional specification for capability approval of manufacturers of multilayer rigid printed wiring boards of assessed quality with plated through holes |
| BS 9762 | Sectional specification for capability approval of manufacturers of double-sided rigid printed wiring boards of assessed quality with plated through holes |

1.3 Base materials

The base materials used shall either comply with BS 4584 or shall be other suitable materials for which an approved manufacturer or user specification is available (see 2.3.4 of BS 9760 : 1977).

The test requirements given in table 2 are applicable to epoxide glass and phenolic paper base materials except where otherwise stated. For base materials other than epoxide glass or phenolic paper, the printed wiring board manufacturer shall define the test requirements for table 2 in his capability manual. This test information shall also be available to the customer.

1.4 Customer detail specification

A customer detail specification (see section three of BS 9760 : 1977) is required for the purchase of printed wiring boards covered by capability approval.

NOTE. A suitable form for a customer detail specification is shown in appendix F.

1.5 Inspection

Printed wiring boards shall not be released until the following has been done:

- (a) capability approval has been obtained by complying with table 2 of this standard or where appropriate (see 1.3) the requirements defined by the manufacturer's capability manual, and with section two of BS 9760 : 1977;
- (b) a customer detail specification has been prepared and agreed (see section three of BS 9760 : 1977;
- (c) production quality conformance inspection in accordance with table 3 of this standard has been carried out.

Section two. Capability approval

2.1 Description of capability: limits of approval

2.1.1 The description of the capability shall comply with **2.2** of BS 9760 : 1977.

NOTE. Capability should be chosen so that it encompasses all printed wiring boards that require release in accordance with BS 9760.

2.1.2 The manufacturer shall describe his capability in terms of active board size (excluding borders), minimum conductor width and spacing, finishes and additional features.

2.1.3 The minimum level of capability permitted shall be as follows:

active board size	270 mm × 170 mm
conductor width and spacing	0.4 mm

2.1.4 The abstract of approval, for inclusion in PD 9002, shall be in tabular form.

NOTE. An example is given in appendix E.

2.2 Demonstration of capability

2.2.1 General

The manufacturer shall demonstrate the boundary limits of the claimed capability in accordance with **2.1**.

2.2.2 Size

2.2.2.1 *Minimum size for capability approval.* The minimum pattern for capability approval shall be one complete composite test pattern (CTP) as shown in appendix A.

2.2.2.2 *Maximum size for capability approval.* Capability for printing wiring boards larger than the CTP shall be demonstrated by printing the CTPs in groups, as shown in appendix D, or by multiple printing of the group pattern shown in appendix B.

2.2.3 Minimum conductor width and spacing

Two sizes of conductor width and spacing are shown in specimen F in appendix C. The manufacturer shall declare which width is being offered for approval. Where the manufacturer wishes to declare a finer width and spacing than shown in specimen F of this standard, he shall provide a specially designed specimen F to demonstrate his capabilities.

2.2.4 Finishes

2.2.4.1 *Different finishes.* All different finishes (organic and inorganic) whether for surface and/or edge contacts shall be assessed separately (see **2.3.3.2**).

NOTE. With the agreement of the National Supervising Inspectorate (NSI), test results for a finish which have been obtained during tests establishing approval to one specification in the BS 9760 series of sectional specifications may be transferred for use in establishing approval to another specification in the series, in lieu of further testing.

2.2.4.2 *Edge connector finish thickness.* The thickness of finishes required for the minimum level of capability shall be as given in table 2.

NOTE. Thinner coatings may be used to demonstrate additional capability.

2.2.5 Additional features

2.2.5.1 *Surface bonded heat sinks or other metallic layers.*

The test specimens used shall be either boards with the test pattern shown in appendix H or suitable production boards, if an equivalent level of assessment is achieved.

Each type of heat sink and its surface finish (e.g. nickel plated copper, anodized aluminium) shall be assessed separately in accordance with table 2.

NOTE 1. Aspects such as shape and the method used to manufacture the heat sink are not assessed. The assessment is restricted to the mechanical and electrical integrity of the bonding and to any degradation of the printed wiring board. Thermal design aspects of the heat sink are not assessed.

NOTE 2. Test results establishing approval for heat sinks on double-sided boards can normally be used to establish approval for multilayer boards.

2.2.5.2 *Other features.* Suitable specimens shall be provided for other features as specified in **2.3.3** of BS 9760 : 1977.

2.3 Capability CTP allocation

2.3.1 Programme of capability assessment

The programme of capability assessment shall comply with **2.3** of BS 9760 : 1977.

2.3.2 Standard patterns

The standard patterns shown in appendices A to D shall be used for demonstrating standard capability.

The quantities of patterns to be supplied for capability assessment shall be as follows:

- (a) for single size CTP: six boards = six CTPs (three separate production lots);
- (b) for double size CTP: three boards = six CTPs (three separate production lots);
- (c) for quadruple size CTP: two boards = eight CTPs (two separate production lots);
- (d) for sizes other than those given in (a) to (c), the CTP layout shall be by agreement with the NSI; a minimum of six CTPs and at least two complete boards shall be provided.

Each of the boards in (a) to (d) shall have the same finish.

2.3.3 Test specimen allocation

2.3.3.1 General. The specimens for each test shall be selected from as many complete boards and CTPs as possible.

Tests for items 1 to 9, 24 and 25 of table 2 shall be carried out on the complete boards before any subdivision into CTPs. The test for items 10 and 26 shall be made on the complete CTP before subdivision into specimens.

The CTPs shall be allocated for test items 10 to 23 of table 2 as shown in table 1. The lots from each CTP shall be kept separate and identified. The capability approval specimens shall be tested in accordance with the schedule given in table 2. Where the performance requirements of table 2 are not applicable, the manufacturer shall specify the test limits, as specified in 2.3.1 of BS 9760 : 1977.

2.3.3.2 Additional finishes. Additional finishes shall be tested using one CTP for each finish in accordance with A.2. Capability approval and production tests shall be selected where possible from table 2 and shall be the subject of agreement between the manufacturer and the NSI.

Solder resists and marking inks shall be considered to be additional finishes.

NOTE. Solder and marking inks are tested using specimens described in appendix G of this standard to minimize costs. Requirements and methods of test for suitable solder resist materials and marking inks are given in BS 6096.

Table 1. CTP allocation	
Approval size (see 2.3)	Allocation
Single size CTP	Three CTPs shall be used to provide specimens for test items 10 to 15 and 18 to 23 of table 2 The other three CTPs shall be used to provide specimens for test items 16 and 17 of table 2
Double size CTP	Three CTPs, one from each board, shall be used to provide specimens for test items 10 to 15 and 18 to 23 of table 2 The other three CTPs shall be used to provide specimens for test items 16 and 17 of table 2
Quadruple size CTP	Three CTPs, one from board 1 and two from board 2, shall be used to provide specimens for test items 10 to 15 and 18 to 23 of table 2 Three CTPs, two from board 1 and one from board 2, shall be used to provide specimens for test items 16 and 17 of table 2

2.3.3.3 Additional features

2.3.3.3.1 Bonded heat sinks. Three boards with the test pattern shown in appendix H or three production boards shall be provided for each type of heat sink and shall be subjected to the tests described in items 24 to 28 of table 2.

2.3.3.3.2 Other features. A suitable number of specimens shall be provided and subjected to the relevant tests as specified in 2.3.3 of BS 9760 : 1977.

2.4 Capability approval acceptance levels

2.4.1 General

The level of assessment for each parameter shall be as given in table 2, based on one of the levels given in 2.4.2 to 2.4.4.

2.4.2 Acceptance level 1

accept	no failures
reject	one failure

2.4.3 Acceptance level 2

accept	one failure
reject	two failures

2.4.4 Acceptance level 3

In the event of one failure in the first set of three specimens, a further three specimens (one from each CTP) shall be tested. In the event of two failures in the first set of three specimens, the lot shall be rejected. This is summarized as follows:

first set of three specimens

accept	no failures
retest	one failure
reject	two failures

second set of three specimens

accept	no failures
reject	one failure

2.5 Capability approval report

The capability approval report shall comply with 2.5 of BS 9760 : 1977.

The capability approval report shall state clearly the range of the manufacturer's approval as described in 2.1 of this standard and also 2.2 of BS 9760 : 1977.

2.6 Abstract of description of capability

The abstract of description of capability shall comply with 2.4 of BS 9760 : 1977.

NOTE. Appendix E gives an example of a format for an abstract of description of capability for inclusion in PD 9002.

Section three. Quality conformance inspection

3.1 General

The requirements for quality conformance during manufacture shall be as given in table 3.

Subgroups A0, A2 and B1 shall be applied to production boards only. Other tests shall be applied either to production boards or to special test circuits.

Production boards subjected to destructive tests marked '(D)' shall not be accepted for release (see 20.2 of BS 9000 : Part 1 : 1981).

3.2 Certified test records

Certified test records shall be prepared giving attributes information as specified in subgroups A5, B8 and C6 in table 3.