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D E C I S I O N
of 24 March 2004

Case Number: T 0276/01 - 3.4.1

Application Number: 95910516.4

Publication Number: 0748450

IPC: G01R 1/073

Language of the proceedings: EN

Title of invention:

Printed circuit board test set with test adapter and method
for setting the latter

Patentee:

MANIA GmbH & Co.

Opponent:

atg test systems GmbH & Co. KG

Headword:

-

Relevant legal provisions:

EPC Art. 123(2), 123(3), 54, 56

Keyword:

"Admissibility of amendments (yes)"

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0276/01 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 24 March 2004

Appellant: atg test systems GmbH & Co. KG
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Respondent: MANIA GmbH & Co.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 12 January 2001
rejecting the opposition filed against European
patent No. 0748450 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: G. Davies
Members: H. K. Wolfrum
M. G. L. Rognoni

Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal against the decision of the opposition division, dispatched on 12 January 2001, rejecting the opposition against European patent No. 0 748 450. The notice of appeal was received on 20 February 2001 and the prescribed fee was paid on the same day. On 4 May 2001 a statement of grounds of appeal was filed.
- II. Pursuant to Article 100(a) EPC, the opposition was based on the grounds of lack of novelty and inventive step (Articles 100(a), 52(1), 54(1) and (2) and 56 EPC).
- III. Oral proceedings were held at the request of the parties on 24 March 2004.

In the oral proceedings the respondent (patent proprietor) replaced all former requests by a single request based on an auxiliary request filed by a letter of 5 March 2004 and further amended in the oral proceedings.

- IV. The appellant requested that the decision under appeal be set aside and the patent be revoked. An inventive step objection was raised against the subject-matter of the respondent's request based on the following documents:

D1: DE-C-29 33 862, and

D2: US-A-4 820 975.

V. The respondent requested the maintenance of the patent in amended form on the basis of the following documents:

claims: 1 to 12 filed in the oral proceedings;

description: pages 1 to 3, 5 and 6 of the patent as granted
pages 3a and 4 filed in the oral proceedings;

drawings: Figures 1 to 3 of the patent as granted.

VI. Independent claims 1 and 6 of the respondent's request read as follows:

"1. Method for setting the contact elements of a printed circuit board test set to the contact points provided on one side of an unloaded mixed-technology printed circuit board for testing the same, which contact elements are accommodated in a test adapter with a supporting element adjacent to the printed circuit board, the supporting element having adapter plates accommodating the contact elements (H,S) for maintaining the latter in test-specimen-specific alignment with the contact points of the printed circuit board (B), wherein said printed circuit board possesses various subsets of contact points and suitable alignment means with respect to the test adapter, in particular, two reference holes or reference edges, and wherein at least one subset (S,S,S) of the contact elements (H,S), accommodated by one of the adapter plates, and alignment means (T) of the test adapter are set relative to one another and thus independently of at least one further subset of

the contact elements by a significant dimension, parallel with the printed circuit board plane.

6. Apparatus for setting the contact elements (H,S) of a printed circuit board test set, which contact elements are accommodated in a test adapter, to the contact points of an unloaded mixed-technology printed circuit board to be tested on one side, with a supporting element adjacent to the printed circuit board (B), the supporting element having adapter plates accommodating the contact elements (H,S) for maintaining the latter in test-specimen-specific alignment with the contact points of the printed circuit board (B), and with suitable alignment means (T) for positioning the printed circuit board in relation to the test adaptor, wherein at least one adaptor plate accommodating a subset (S,S,S) of the contact elements (H,S) is to a limited extent adjustable independently of the alignment means (T) and of the rest of the contact elements of the test adapter, in parallel with the printed circuit board."

Claims 2 to 5 and 7 to 12 are dependent claims.

VII. The appellant essentially relied on the following submissions:

Document D1 was concerned with the alignment and setting of contact pins of a test adapter to the contact points of an unloaded printed circuit board (PCB), wherein the contact points were formed by metal-plated through-holes for wire bonding. The PCB was aligned with and set onto the test adapter by means of

positioning pins fitting into reference holes of the PCB.

Another method and apparatus, known from D2, concerned the alignment and setting of contact elements of a test adapter by means of moving, with the help of optical alignment means, the test adapter relative to the PCB in a plane parallel to the PCB, the contact points of which were formed by narrowly spaced contact pads for the bonding to surface mounted devices.

At the priority date of the opposed patent, "mixed technology" PCBs comprising contact holes for wire bonding as well as contact pads for surface mounted devices were commonly used. The skilled person would have been aware of the fact that none of the methods known from D1 and D2 was suitable for testing both types of contact points. A logical consequence of this recognition was to combine the method known from D1, which had proven to be successful for testing PCBs having contact holes, with that known from D2, which had proven to be successful for the testing of PCBs having contact pads, and to devise a corresponding test apparatus allowing to simultaneously test both types of contact points. In this context, the teaching of D2 would have made the skilled person aware of the problem of a possible misalignment due to unpredictable variations occurring in the relative positions of alignment holes and the contact pads on the PCB. Thus, it would have been immediately evident for the skilled person that the subset of contact elements of the test adapter to be brought into contact with the contact holes and the subset of contact elements to be set to the contact pads of a mixed technology PCB had to be

adjustable independently of each other. Moreover, since the test adapters known from each of documents D1 and D2 had a supporting element comprising adapter plates for accommodating the contact elements, the skilled person would have arrived at the solution according to the subject-matter of independent claims 1 and 6 without having to exercise inventive skill.

VIII. The respondent's submissions may be summarised as follows :

Neither of the teachings of documents D1 and D2 was concerned with a solution to the problem that, due to unintentional production errors, some of the contact points of a mixed technology PCB might be displaced in relation to other contact points of the same PCB. Although D2 mentioned in the introductory part of the description that an alignment problem could arise from an unintentional variation in the position of alignment holes and contact pads, it avoided the problem by making use of alignment marks formed in the same manufacturing process as the contact pads of the PCB.

Contrary to the impression given by the appellant, D1 and D2 referred to related methods for setting contact elements of a test adapter. Hence, the claimed invention was not a mere combination, dictated by circumstances, of two different methods. Any other interpretation of the prior art teachings, as put forward by the appellant, was nothing but an inadmissible ex post facto analysis.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Amendments*
 - 2.1 Amended claims 1 and 6 are based on claims 1 and 6 of the patent as granted. The amendments concern in essence a limitation to a test set having one test adapter (instead of "one or two test adapters" or "at least one test adapter" according to claims 1 and 6 as granted) and the introduction of the features that the supporting element has adapter plates accommodating the contact elements and that it is at least one adapter plate accommodating a subset (S,S,S) of the contact elements (H,S) which is to a limited extent adjustable independently of the alignment means (T) and of the rest of the contact elements of the test adapter.

The amendments serve to remove an ambiguity and to define more precisely the fact that subsets of contact elements of a single adapter are adjustable independently from each other. They are originally disclosed in the context of the description of the sole embodiment of Figure 3.

 - 2.2 Dependent claims 2 to 5 and 7 to 12 correspond to claims 2 to 5 and 8 to 10 and 12 to 14, respectively, of the patent as granted, their terminology being adapted to that of the independent claims.

2.3 As regards the amendments, the appellant has not raised any objections under Articles 123(2) and (3) EPC and the Board sees no reason to judge the matter differently.

2.4 Although the aforementioned amendments were in part filed at a late stage in oral proceedings, they lie within the framework of what had been argued by the respondent as constituting the invention and thus the subject of the debate of the parties from the beginning of the appeal proceedings.

Consequently, the Board saw no reason not to admit the appellant's request filed during the oral proceedings.

3. *Patentability (Articles 52(1), 54 and 56 EPC)*

3.1 Document D1 (see in particular Figures 1 and 3 with the corresponding description) refers to a printed circuit board test set and a method for setting the contact elements thereof to the contact points of a printed circuit board (PCB). The known test set comprises a test adapter (14) accommodating a plurality of contact elements (82) in the form of contact pins. The contact pins are held in alignment with a pattern of contact holes (84) of a PCB (72) by a supporting element comprising adapter plates (such as 30 and 32), which are spaced from each other along the extension of the contact pins. The contact pins are guided by holes (86 and 88) in the adapter plates, which holes coincide in position, upon proper alignment, with the contact holes (84) of the PCB. The alignment of the PCB to be tested with respect to the test adapter is established by means of reference pins (70) of the test adapter

fitting into corresponding reference holes (83) of the PCB (see Figure 3 and column 5, line 48, to column 6, line 10).

The test adapter known from D1 does not comprise any means which would allow an independent adjustment of a subset of the contact pins with respect to another subset of the contact pins of the test adapter and to the reference pins.

- 3.2 Document D2 (see in particular Figures 1, 2 and 4 with the corresponding description) relates to a method and a corresponding apparatus for setting the contact elements of a printed circuit board test set to contact pads (43) on a PCB (42). The test set comprises two test adapters (15,16), each having a set of contact elements (probes 17) to be brought into contact with the contact pads on a respective side of the PCB, which is held between the two test adapters by means of a jig (see column 3, lines 17 to 18). Each test adapter has a supporting element which comprises a stack of plates (18,19,10 and 40,41,13, respectively). In order to align the contact elements of a test adapter with the contact pads of the PCB, one of the plates in each stack is movable with respect to the other plates and the PCB in the X-direction of a plane parallel to the plane of the PCB, whereas another plate is independently movable in the Y-direction of said plane. Proper alignment is effected via appropriate movements of the X- and Y-plates by bringing an optical graticule which has a fixed positional relationship to the contact elements of the test adapter into alignment with alignment marks (47) on the PCB (see Figure 4).

As in the case of document D1, the test set known from D2 does not possess any means which would allow a displacement of subsets of the contact elements of one adapter with respect to each other and/or to alignment means of the same adapter.

3.3 It follows from the above observations that the subject-matter of independent claims 1 and 6 under consideration, which foresees a supporting element having at least one adapter plate which accommodates a subset of the contact elements of one test adapter and is adjustable in parallel with the printed circuit board independently of the alignment means as well as of the rest of the contact elements of the same test adapter, is novel with respect to the teachings of documents D1 and D2.

3.4 The Board concurs with the appellant that, with the emergence of mixed technology PCBs and the need to test the same, the problem of inadvertent displacement of a PCB's contact points relative to one another, in particular when formed in different manufacturing steps, would not have gone undetected by the skilled person.

However, the appellant has not produced any convincing evidence as to existing prior knowledge about the solution to this problem as defined by the subject-matter of claims 1 and 6 on file. In particular, the teachings of documents D1 and D2 do not hint at the idea to render a subset of the contact elements of one test adapter adjustable with respect to the alignment means and to another subset of contact elements of the same test adapter. In this context, it is questionable whether the recognition of the as such obvious problem

would have given the skilled person the idea of rendering subsets of contact elements independently adjustable in parallel with the PCB. At any rate, neither the recognition of the problem nor the teachings of documents D1 and D2 provide any indication as to the claimed implementation of this idea, ie as to providing adapter plates each of which accommodates an individual subset of the contact elements of a test adapter and rendering at least one of the adapter plates adjustable to the alignment means and the rest of the contact elements accommodated on the further adapter plates.

Hence, in the Board's opinion, the skilled person knowing about the teachings of D1 and D2 would not have been led by obvious and straightforward considerations to the claimed subject-matter.

Moreover, the Board notes that none of the other documents cited in the patent or referred to in the opposition and appeal proceedings contains an indication as to the claimed solution.

- 3.5 For the above reasons, the subject-matter of claims 1 and 6 under consideration is to be considered novel and inventive and thus complies with the requirements of Articles 52(1) and 54 EPC Article 56 EPC.
- 3.6 The dependent claims relate to embodiments of the invention defined in claims 1 and 6.
4. In summary, the Board has come to the conclusion that, taking into consideration the amendments made to the patent documents according to the respondent's sole

request, the patent and the invention to which it relates meet the requirements of the EPC.

Order

For these reasons it is decided that :

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the respondent (patentee)'s request.

The Registrar:

The Chairman:

R. Schumacher

G. Davies