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**Datasheet for the decision
of 12 June 2012**

Case Number: T 1036/08 - 3.4.02

Application Number: 06003601.9

Publication Number: 1693666

IPC: G01N21/35, // B23K3/00

Language of the proceedings: EN

Title of invention:

Solder material test method and apparatus, control program and computer-readable recording medium

Applicant:

OMRON CORPORATION

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive Step - Independent claims (after amendment - yes)

Decisions cited:

Catchword:



Case Number: T1036/08 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 12 June 2012

Appellant:
(Applicant)

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 24 January 2008
refusing European patent application No.
06003601.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. Klein
Members: M. Rayner
B. Müller

Summary of Facts and Submissions

I. The patent applicant has appealed against the decision of the examining division refusing European Patent Application number 06003601.9. The application concerns a solder test method and apparatus. In the following reference is made to documents referenced as below:-

D1 US-A-5 476 207

D2 JP-B-8-20434

D5 JP-A-3 287 60.

II. In the decision under appeal, the examining division referred to the following passages of document D1, which are also cited verbatim in the present decision.

(i) column 2, lines 30 to 34

"...of a plurality of locations spaced laterally of the passline, passing infrared light having a range of wavelengths, through the wall of flux to cause different wavelengths of the infrared light to be absorbed at least partially by different materials in the flux;
receiving the unabsorbed infrared light which has..."

(ii) column 3, lines 15 to 19

"concentrations at that location; and means to effect a change in the flux concentration at any of the locations towards a desired flux concentration when a generated signal at that location differs from a datum signal which corresponds to the desired flux concentration."

(iii) column 4, lines 53 to 62

"light transmitted and received by the FT-IR 47 are then shown for each of the receiving assemblies 41 upon

a visual monitor 49 for instance as shown by FIG. 4 which represents graphically along the vertical axis the absorption units of the wavelengths of infrared light and along the horizontal axis the actual wavelengths of the light. On the visual readout, three different curves 50, 52 and 54 may be represented simultaneously, each curve representing the differences between the transmitted infrared light and the unabsorbed light received by each of the receiving assemblies 40,"

(iv) column 5, lines 40 to 50

"of flux. It is thus possible to monitor the quantities of flux constituents on a continuous basis by use of the visual monitor. If a problem is found to exist with the concentration in the flux at any of the locations across the passline by the positions of beams 44, then operation of the apparatus may be ceased immediately to enable a correction to be made to the flux concentration.

Hence, as correction may be made to flux concentration almost immediately after a variation away from the concentration requirements occurs, then only a minimal amount of printed circuit boards may be affected by this problem."

III. In the decision under appeal, the examining division considered the subject matter of the independent claims according to the main request before it to lack inventive step. Its reasoning included the following.

Document D1 is the closest prior art and discloses:

a solder material test method including;

- a) a first detecting step of detecting a first intensity at a particular wave number of infrared ray from a particular wave number of infrared ray from a test-sample solder material by illuminating light to the test-sample solder material (cf. col. 2, lines 30 to 34);
- b) a second detecting step of detecting a second intensity at the particular wave number of infrared ray from a comparative-sample solder material by illuminating light to the comparative-sample solder material (cf. col. 3, lines 15 to 19, and col. 5, lines 40 to 50);
and
- c) a test step of testing a deterioration degree of the test-sample solder material relatively to the comparative-sample solder material, depending upon the first and second intensities detected (cf. col. 4, lines 52 to 62, and col. 5, lines 40 to 50).

The subject matter of claim 1 differs from the disclosure of document D1 in that reflected rather than transmitted light is detected. It is, however, considered that the skilled person would come to a reflectivity measurement whenever the sample thickness, its absorptivity, or simply the geometry of the experiment do not permit a transmission measurement. The actual disclosure of D1 is understood as the applicability of the infrared spectroscopy to the analysis of solder material, therefore, in transmission and reflection equally. In a situation in which the composition of the solder material extinguishes the transmitted light, the skilled person is compelled to the measurement of the reflected light, arriving at the subject-matter of claim 1 without having to be inventive.

The term solder material is broad enough also to encompass flux as measured in document D1 because solder material has to be interpreted as any material taking part in the soldering process. Carboxylic acid, also known as rosin, is a basic component of a major group of flux materials, which means the solder material in the application comprises the fluxing substance. Furthermore, a passage in the present application (see page 3, last line) presents flux and solder material as synonyms.

- IV. Further to a communication by the board, the appellant requested that the decision under appeal be set aside and a patent granted on the basis of its main request. Also requested on an auxiliary basis were oral proceedings.

The appellant explained that document D5 is a family member of document D2, the document in the passage mentioned at the bottom of page 3, last two lines of the present application, and relates to the measurement of the acid value of flux.

In support of its case the appellant argued as follows.

The passage on page 3 of the present application relates to the discussion of the prior art and reads "... method to measure the acid degree of a solder material (flux) by...", which the examining division interpreted as equating the term "solder material" with "flux". In fact, there is no indication, such as an equals sign that this is true. The passage can be interpreted that the degree of flux, contained in the solder material, is measured when measuring the acid value. The solder material according to the invention

is a mixture of several solder material components, which is applied on a board for soldering of electronic components and thus does not refer merely to flux.

Document D1 relates to a method and an apparatus for fluxing and soldering terminals on a printed circuit board. At a flux application station 16, a monitoring means 22 is provided, which comprises a central opening 34 for enabling a wall 35 of flux, directed upwardly, to pass through the opening 34 so as to contact the undersides of printed circuit boards 14 passing through the flux application station 16. The wall of flux is measured as it is spray applied to the circuit boards 14, i.e., on its way from a bath 30 of flux to the printed circuit boards 14. The monitoring means 22 comprises means for transmitting and receiving infrared light through the wall of flux. The receiving means receives unabsorbed infrared light, which has passed through the wall of flux. Infrared light having a different wavelength may be absorbed by the wall of flux to a degree that is dependent upon the quantities of the different materials in the flux at that particular location in the wall. It is thus possible to monitor the quantities of flux constituents on a continuous basis by visual monitor. Both the spray-application of the flux and the infrared light transmitting measurement are only feasible with a material which has a low viscosity, but never with a solder material according to claim 1, which is a solder paste. A skilled person, searching for a solution to determining a deterioration degree of the solder material, is lead away from document D1 by the spray application of the flux and the transmission measurement. The skilled person would not therefore take the teaching of document D1 into further consideration.

No specific arguments were provided by the examining division concerning a test step of testing a deterioration degree of the test-sample solder material relatively to the comparative-sample solder material depending on the detected intensities. The examining division thus considered that document D1 implicitly disclosed the determination of a deterioration degree. However, document D1 aims to control the application of flux material and does not measure or determine specific flux constituents or a deterioration degree of the flux material. In fact, document D1 is silent as regards the quality of the flux material.

For the above reasons, the subject-matter of claim 1 is clearly novel over the cited document D1 and is further based on an inventive step. The same reasoning applies to the corresponding device claim 18.

V. The independent claims according to the main request of the appellant are worded as follows.

"1. A solder material test method including:
a first detecting step of detecting a first intensity at a particular wave number of infrared ray reflected from a test-sample solder material by illuminating light to the test-sample solder material;
a second detecting step of detecting a second intensity at the particular wave number of infrared ray reflected from a comparative-sample solder material by illuminating light to the comparative-sample solder material; and
a test step of testing a deterioration degree of the test-sample solder material relatively to the comparative-sample solder material, depending upon the first and second intensities detected, wherein the

solder material is a solder paste.

18. A solder material test apparatus comprising:
a light source that illuminates light to a test-sample solder material and a comparative-sample solder material;
intensity detecting means that detects a first intensity at a particular wave number of infrared ray reflected from the test-sample solder material due to illumination of the light, and a second intensity at the particular wave number of infrared ray reflected from the comparative-sample solder material due to illumination of the light; and
control means that outputs a deterioration parameter indicative of a comparative deterioration degree of the test-sample solder material relatively to the comparative-sample solder material, depending upon the first and second intensities detected, wherein the solder material is a solder paste.

19. A control program for a solder material test apparatus, wherein function in the control means according to claim 18 is realized by a computer.

20. A computer-readable recording medium recording the control program according to claim 19."

Reasons for the Decision

1. The appeal is admissible.
2. The disagreement between the appellant and the examining division about the meaning of solder material lies at the root of the present appeal. The board agrees with the appellant that flux is not a solder material, the reason being that the term solder

material, in the present independent claims specified as solder paste, does not equate to any material taking part in the soldering process. This view is not changed by reference to document D5 in the family of document D2 referred to at the bottom of page 3 of the application, because the document concerned, while disclosing light is passed through a reaction chamber, relates, nevertheless, to controlling concentrations of flux to be measured with high accuracy using a device which makes measurements by using chemical means (titration).

3. Moreover, solder paste not being flux leads to the approach of the examining division in relation to document D1 containing a serious fault line because all the references set out in sections II(i) to II(iv) of the Facts and Submissions above refer to flux and/or infrared light transmitted therethrough. Consequently, not only is the subject matter of claim 1 novel by virtue of the reference to reflected light as acknowledged by the examining division, but also because of the reference to solder material. Moreover, the step testing deterioration degree is also missing, because according to document D1, flux concentration is monitored and corrected as necessary, which is something different.

4. The case of the appellant on inventive step is more convincing than that of the examining division because spray application and infrared light transmitting measurement are only feasible with a material which has a low viscosity like flux, but not with solder paste. Hence, as the appellant submitted, document D1 would be dismissed as not relevant to solder paste by the skilled person. Moreover, even if, nevertheless, a skilled person were able to dismantle the transmission

- system known from document D1 and build a fresh different reflective version of some sort for flux, why should this be done and how would it be pertinent to testing a deterioration degree of solder paste? Only hindsight knowledge of the invention, and the wish to read this on to document D1 raise these questions at all. Only such a hindsight driven analysis forms a convincing basis for calling into question the inventive step of the method according to claim 1.
5. Accordingly, the board reached the conclusion that the subject matter of method claim 1 is not deprived of an inventive step by the disclosure of document D1.
 6. Apparatus claim 18 contains features, corresponding in substance to those dealt with in respect of the method claim and a corresponding conclusion therefore applies in relation to inventive step for corresponding reasons. Likewise, function in the control means as referred to in claim 19 directed to a control program and including a reference to claim 18 calls for presence of this substance as does claim 20 directed to a computer readable recording medium by its reference to claim 19.
 7. No other document in the file gave the board reason to doubt the patentability of the subject matter of the independent claims.
 8. In view of the foregoing and since the board sees no other bar to grant of a patent, the oral proceedings requested on an auxiliary basis are not necessary and the board considers it appropriate to exercise powers within the competence of the first instance and order grant of a patent.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

Description:

Pages 1-3 and 5-58 as originally filed.

Page 4 received with letter of 12 January 2007.

Claims:

No. 1-20 received with letter of 05 April 2012.

Drawings:

Sheets 1/11-11/11 as originally filed.

The Registrar:

The Chairman:



M. Kiehl

A. Klein

Decision electronically authenticated