

An Electrical Contact and Testing Platform

Field of the Invention:

The present invention relates to an electrical contact and testing
5 platform, in particular, but not exclusively, to an electrical contact and
testing platform using to test electrical components.

Background to the Invention:

Existing methods of testing an electrical component involve
10 positioning the component to be tested onto a testing platform. The
testing platform comprises electrical contacts which are used to power
the electrical component. Once powered the performance of the
electrical component is monitored. Based on the performance of the
electrical component it can be determined whether or not the
15 electrical component is faulty.

To ensure successful testing of the electrical components it is necessary
that electrical contacts of the component electrically connect with the
electrical contacts on the testing platform. For this the electrical
20 component must be positioned at a very specific predefined location,
in a very specific predefined orientation. Positioning the electrical
component on the testing platform at such a specific predefined
location in the specific predefined orientation, is very difficult to
achieve, in particular in an industrial environment where test
25 operations are carried out at high speeds and there are many moving
machine parts. Positioning the electrical component is further made
difficult due to physical variations between electrical components,
for example, physical variations between electrical components may
occur due to mould offset during the manufacturing stage.

Figures 1a-f illustrates how it can be difficult to achieve the specific positioning of an electrical component 7 required to ensure that the electrical contacts of the electrical component 7 electrically connect with the electrical contacts on a testing platform 1. A testing platform 1 shown in Figure 1 comprises six electrical Kelvin contacts 3a-3f. Each electrical Kelvin contact 3a-3f comprises an "I" blade 5a and an opposing "L" blade 5b. During testing of electrical component 7 the "I" blade 5a forms a signal supply terminal and the opposing "L" blade 5b forms a signal sense terminal (or vice versa).

The electrical component 7 to be tested comprises six electrical contacts in the form of pins 9a-f. To enable testing of the electrical component 7, the electrical component 7 must be positioned on the platform 1 such that each pin 9a-f establishes an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in each corresponding electrical contact 3a-3f on the testing platform 1. During testing of the electrical component 7, at each electrical contact 3a-3f a test signal is transmitted by the "I" blade 5a (i.e. the blade which forms the signal supply terminal), through a pin 9a-f, and into the opposing "L" blade 5b (i.e. the blade which forms the signal sense terminal). At each signal sense terminal the test signal is sensed to determine if the pin 9a-f has transmitted and/or modified the test signal as expected.. The performance of the electrical component 7 at each of the six pins 9a-f can thus be determined.

Figure 1(a) shows the electrical component 7 when located in the specific predefined location and orientation required for testing. In this position each pin 9a-f establishes an electrical connection between

the "I" blade 5a and the opposing "L" blade 5b in each corresponding electrical contact 3a-3f on the testing platform 1. In the position the electrical component 7 can be tested as previously described.

5 Figure 1(b) shows the electrical component 7 which has been off-set in a first direction along the Y-axis. In this position each of the pins 9a-f fail to establish an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in each electrical contact 3a-3f on the testing platform 1. Thus, the electrical component 7 cannot be tested.

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Figure 1(c) shows the electrical component 7 which has been off-set in a second direction along the Y-axis. In this position the pins 9a-f fail to establish an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in each corresponding electrical contact 3a-3f on the testing platform 1. Thus, the electrical component 7 cannot be tested.

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Figure 1(d) shows the electrical component 7 which has been off-set in a first direction along the X-axis. In the position the pins 9a, 9b and 9c fail to establish an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in the electrical contacts 3a, 3b and 3c on the testing platform 1. Thus, the electrical component 7 cannot be tested.

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25 Figure 1(e) shows the electrical component 7 which has been off-set in a second direction along the X-axis. In the position the pins 9c, 9d and 9f fail to establish an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in the electrical contacts 3d, 3e and 3f

on the testing platform 1. Thus, the electrical component 7 cannot be tested.

Figure 1(f) shows the electrical component 7 which is not positioned
5 on the platform 1 in the correct orientation; the electrical component 7 has been rotated with respect to the platform 1. In this position the pins 9c and 9d fail to establish an electrical connection between the "I" blade 5a and an opposing "L" blade 5b in the electrical contacts 3c and 3d on the testing platform 1. Thus, the electrical component 7
10 cannot be tested.

Many measures have been taken to facilitate the establishment of an electrical connection between the blades 5a,5b of the electrical contacts 3a-f on the testing platform 1, by the electrical contacts of an
15 electrical component 7. One such measure is illustrated in Figures 2(a)-2(f). Unlike the platform 1 illustrated in Figures 1(a)-1(f) a platform 10 illustrated in Figure 2 comprises six electrical contacts 30a-30f, wherein each electrical contact 30a-30f comprises two parallel "I" blades 50a, 50b. Each blade 50a, 50b has a longitudinal configuration and
20 comprises a planar surface 51 which is parallel to a plane 52 of the chip 7 when the chip 7 is positioned on the platform 10 for testing.

The principles for testing the electrical component 7 are the same as those described for platform 1 shown in Figure 1. Thus, it is a
25 requirement that the electrical component 7 to be tested is positioned such that each pin 9a-f establishes an electrical connection between the two "I" blades 50a, 50b in each corresponding electrical contact 30a-30f on the testing platform 10. During testing of the electrical component 7, at each electrical contact 30a-30f, signal is passed from a

first "I" blade 50a (which force the electrical signal), through a pin 9a-f, and measure by a second "I" blade 50b (which sense the electrical signal, or vice versa). The performance of the electrical component 7 at each of the six pins 9a-f can thus be determined.

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Figure 2(a) shows the electrical component 7 when located in an ideal testing position on platform 10. In this position each pin 9a-f establishes an electrical connection between the two parallel "I" blades 50a, 50b in each corresponding electrical contact 30a-30f on the testing platform 10. In this position the electrical component 7 can be tested as previously described.

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As is evident from Figures 2(d)-(f), because of the configuration of the two "I" blades 50a, 50b in each electrical contact 30a-30f, the pins 9a-f of the electrical component 7 can successfully establish an electrical connection between the two parallel "I" blades 50a, 50b in each electrical contact 30a-30f, even when the electrical component 7 is off-set along the X-axis (see Figures 2(d) and 2(e)) or rotated with respect to the platform 10 (see Figure 2(f)). In particular, the parallel configuration of the two "I" blades 50a, 50b and the longitudinal configuration of each "I" blade 50a, 50b each facilitate the establishment of an electrical connection between the two parallel "I" blades 50a, 50b in each electrical contact 30a-30f, by the pins 9a-f, when the electrical component 7 is off-set along the X-axis (see Figures 2(d) and 2(e)) or rotated with respect to the platform 10 (see Figure 2(f)). The planar surface 51 of each blade 50a, 50b also facilitates the establishment of an electrical connection, as the planar surface 51 increases the contact area available in each blade 50a, 50b which can be used to establish electrical contact with that blade

50a,50b. Thus, the electrical component 7 can still be tested even when it has been off-set from the ideal testing position.

However, even though the measure illustrated in Figures 2(a)-(f) facilitates the establishment of an electrical connection between the blades 5a,5b of the electrical contacts 3a-f on the testing platform 1, by the pins 9a-f of the electrical component 7, the measure is still not satisfactory as pins 9a-f will still fail to successfully establish an electrical connection between the two parallel "I" blades 50a, 50b in each electrical contact 30a-30f, when the electrical component 7 is off-set along the Y-axis. Figures 2(b) and 2(c) illustrate the case when the electrical component 7 is off-set along the Y-axis.

Thus, the provision of electrical contacts 30a-f which comprise two parallel "I" blades 50a, 50b, each of which comprises a planar surface, is effective in facilitating the establishment of the electrical connections required for testing of the component 7, when the electrical component 7 is off-set along the X-axis, or is rotated with respect to the platform 10. However, such electrical contacts 30a-f do not facilitate the establishment of an electrical connection between the blades 5a,5b of the electrical contacts 3a-f on the testing platform 1, by the pins 9a-f, when the electrical component 7 is off-set along the Y-axis.

It is an aim of the present invention to obviate or mitigate one or more of the aforementioned disadvantages.

Summary of the Invention:

According to an aspect of the present invention there is provided

an electrical contact comprising three or more blades, so as to facilitate the establishment of an electrical connection between at least two of the blades by an electrical contact of a component.

- 5 According to a further aspect of the present invention there is provided
a testing platform suitable for receiving a component to be tested,
wherein the testing platform comprising one or more electrical
contacts each of which comprise three or more blades, so as to
10 facilitate the establishment of an electrical connection between at
least two of the three or more blades by an electrical contact of a
component.

- 15 The electrical connection may be a Kelvin connection. For an electrical
contact to form a Kelvin contact, the electrical contact of the
component must electrically contact at least 2 of the three or more
blades.

- 20 The component may be an electrical component.

The three or more blades may facilitate the establishment of an
electrical connection between two or more of the blades by an
electrical contact of the component.

- 25 The electrical contact may be an electrical terminal of the component.

The three or more blades may extend longitudinally.

The three or more blades may be arranged in parallel.

Each of the three or more blades may be "I" blades.

5 At least some of the one or more electrical contacts may be arranged in the same orientation. Preferably, all of the one or more electrical contacts are arranged in the same orientation.

10 Each of the three or more blades may comprise a planar surface. The planar surface may be parallel to a plane of the electrical component to be tested when the electrical component is positioned on testing platform for testing. In use, the planar surface is parallel to a plane of an electrical component being tested.

15 The three or more blades may be arranged to define two or more channels. Each of the two or more channels may be isolation channels. The isolation channels may be configured to electrically isolate each of the three or more blades from one another. Some or all of the two or more channels may be isolated from one another. Each of the two or more channels may have a width of between $0.1\mu\text{m}$ – $50\mu\text{m}$.
20 Preferably, each of the two or more channels have a width less than $30\mu\text{m}$. Most preferably, each of the two or more channels have a width less than $20\mu\text{m}$.

25 The width of each of the three or more blades may be such that the combined width of two of the two or more isolation channels plus the width of a single blade, is less than the width of an electrical contact of an electrical component. Preferably, the width of each of the three or more blades is such that the combined width of two of the two or more isolation channels plus the width of a single blade, is less than

the width of an electrical contact of an electrical component, after fabrication tolerances have been accounted for. The width of each of the three or more blades may be such that the combined width of one of the two or more isolation channels plus the width of two of the
5 three or more blades, is less than the width of an electrical contact of an electrical component. Preferably, the width of each of the three or more blades may be such that the combined width of one of the two or more isolation channels plus the width of two of the three or more blades, is less than the width of an electrical contact of an electrical
10 component, after fabrication tolerances have been accounted for. Each of the three or more blades may have a width of 200 μm or less. Preferably, each of the three or more blades have a width of 150 μm or less. More preferably, each of the three or more blades have a width of 100 μm or less.

15 Some or all of the blades may comprise a conducting metal. Preferably, some or all of the blades are coated with a metal. The metal may be a Nobel metal. Some or all of the blades may comprise gold, BeCu and/or BeNi. Some or all of the blades may be coated with
20 gold. Some or all of the blades may be coated with BeCu or BeNi material, or any other material which exhibits a spring effect, electrical conductivity and wear resistance.

Some or all of the blades may comprise a hardened tip. Preferably,
25 some or all of the blades comprise Tungsten. Most preferably, the tip of some or all of the blades comprises Tungsten.

The three or more blades may be secured so that they are in a fixed position relative to one another. Preferably the three or more blades

are secured during the manufacturing stage, so that they are in a fixed position relative to one another. The three or more blades may be moulded or glued together.

- 5 The electrical contact may further comprise a holding member which holds the three or more blades so that they are in a fixed position relative to one another.

10 According to a further aspect of the present invention there is provided
a test machine component, comprising a holder member which comprise any one of the aforementioned electrical contacts, wherein the test machine component is configured such that it can co-operate with a test machine.

15 The test machine component may comprise a plurality of electrical contacts.

20 The test machine component may further comprise guide means which facilitate co-operation of the test machine component with the test machine. For example, the guide means may be a pin suitable for co-operating with a hole on a test machine, or the guide means may be a hole suitable for co-operating with a pin on the test machine.

25 According to a further aspect of the present invention there is provided
a test machine comprising an electrical contact according to any one of the aforementioned electrical contacts.

Brief Description of the Drawings:

An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings in which, Figures 1a-f difficulties in achieving the specific positioning of an electrical component, on a prior art testing platform, which is required to enable the testing of the electrical component;

Figures 2 a-f illustrates a prior art testing platform, which comprises electrical contacts which are configured to facilitate the establishment of the electrical connections required for testing of an electrical component;

Figure 3 provides a plan view of a testing platform according to the present invention which comprises an electrical contacts according to the present invention;

Figures 4a-f illustrates how the electrical contacts according to the present invention facilitate the establishment of the electrical connections which are required for testing of an electrical component; and

Figure 5a provides a plan view of a test machine component according to the present invention and Figure 5b provides a magnified view of the electrical contacts of the test machine component shown in Figure 5a.

Detailed Description of the Drawings

Figure 3 provides a plan view of a testing platform 100 according to the present invention. An electrical component to be tested, in the

form of a chip 29, is positioned on a stage 25 of the testing platform 100.

5 The testing platform 100 comprises six electrical contacts 51a-f, according to the present invention, which are each supported on the stage 25. All six of the electrical contacts 51a-f are arranged in the same orientation on the stage 25. It will be understood that the testing platform 100 is not limited to having six electrical contacts; the testing platform 100 may have more or less electrical contacts. For
10 example, testing platform 100 may comprise 10 electrical contacts or 4 electrical contacts.

Each electrical contact 51a-f comprises three blades 71a-c. The three blades 71a-c extends longitudinally, across part of a width "g" of the
15 stage 25 and the three blades 71a-c of each electrical contact 51a-f are arranged in parallel. The three blades 71a-c may be secured to the stage 25 during the manufacturing stage, so that the blades 71a-c maintain a fixed position relative to one another.

20 The three blades 71a-c of each electrical contact 51a-f define two isolation channels 15a,15b. The isolation channels 15a,15b are configured to electrically isolate each of the three blades 71a-c from one another.. In this particular example the isolation channels 15a,15b each have a width "c" of 10µm. However, it will be understood that
25 the isolation channels 15a,15b may have any other suitable dimensions.

The three blades 71a-c of each electrical contact 51a-f each comprise a planar surface 13. The planar surface 13 of each blade 71a-c is parallel

to a plane 17 of the chip 29, when the chip 29 is positioned on testing platform 100 for testing. In this particular example each of the three blades 71a-c have a width "w". The width "w" of each blade 71a-c is such that the combined width "c" of an isolation channel 15a,15b plus the width "w" of two of the three or more blades, is less than the width "e" of a pin 11a-f of the electrical component 29, after fabrication tolerances have been accounted for (i.e. $2w+c < e$). It will be understood that alternatively, the width "w" of each of the three or more blades can be such that the combined width "c" of two of the isolation channels 15a,15b plus the width "w" of a single blade 71a-c, is less than the width "e" of a pin 11a-f of the electrical component 29, after fabrication tolerances have been accounted for (i.e. $2c+w < e$). In this particular example each of the three blades 71a-c have a width "w" of 100 μm , so the planar surface 13 of each blade will have a width of 100 μm . However, it will be understood that the blades 71a-c (and therefore the planar surfaces 13) could have any other suitable dimensions. In this particular example the width "e" of each electrical contact 11a-f of the electrical component 29 being tested is 300 μm .

In this particular example each of the three blades 71a-c is coated with gold, and is provided with Tungsten at a tip 19 of each blade 71a-c. The Tungsten hardens the tip 19 of each blade 71a-c. It will be understood that the blades 71a-c could be coated with any another suitable metal or not coated at all, for example, the blades 71a-c could be coated with any Nobel metal. The blades 71a-c could be comprise BeNi or BeCu or any other electrically conductive spring material.

The chip 29 to be tested comprises six electrical contacts in the form of pins 11a-f. However, it will be understood that the chip 29 could

comprise any number of pins, so the chip 29 could have more or less than 6 pins. In Figure 3, the chip 29 is shown in the ideal position for testing. In the ideal position for testing the chip 29 is perfectly square on the stage 25 of platform 100 and each of the pins 11a-f is

5 symmetrically positioned with respect to a corresponding electrical contact 51a-f. Each of the six pins 11a-f co-operates with a corresponding electrical contact 51a-f on the stage 25 to provide an electrical connection between any two of the three blades or all three blades 71a-c in each electrical contact 51a-f.

10 For testing of the chip 29, it is necessary that the chip 29 be positioned on the stage 25 such that for each electrical contact 51a-f, a pin 11a-f of the chip 29 bridges at least one of the isolation channels 15a, 15b so as to provide an electrical connection between at least two of the three blades 71a-c. During testing of the chip 29, one of two blades

15 71a-c which are electrically connected by the pins 11a-f, will act as a signal supply terminal during testing while the other of the two blades 71a-c will act as a signal sense terminal, or vice versa. During testing of the chip 29, current is passed from the blade 71a-c which provides the signal supply terminal(s), through a pin 11a-f, and

20 voltage is sense or measured by the blade 71a-c which forms the signal sense terminal(s). The performance of the chip 29 at each of the six pins 11a-f can be monitored and thus the overall performance of the chip 29 can be determined.

25 As shown in Figure 3, if and when the chip 29 is positioned in the ideal position for testing, the pins 11a-11f are shown to bridge both isolation channels 15a, 15b so that each pin 11a-11f touches three blades 71a-c thus electrically connecting each of the three blades 71a-c. Accordingly, in the special case where the chip 29 has been positioned

in the ideal position for testing, any one or two of the three blades 71a-c can be chosen to provide the signal supply terminal during testing of the chip 29 and any of the other blades 71a-c can be chosen to provide the signal sense terminal during testing of the chip 29.

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As illustrated in Figures 4(a)-(f) the configuration of the electrical contacts 51a-f illustrated in Figure 3, facilitates the establishment of the electrical connections which are required for testing of the chip 29. Figure 4(a) shows the chip 29 in an ideal testing position (as previously described with reference to Figure 3). Similar to the electrical contacts 30a-f of the prior art testing platform 10 depicted in Figures 2(a)-(f), the electrical contacts 51a-f of the testing platform 100, depicted in Figures 4(a)-4(f), facilitates the pins 11a-f of chip 29 in successfully establishing an electrical connection between two of the three blades 71a-c in each electrical contact 51a-f, even when the chip 29 is off-set along the X-axis (see Figures 4(d) and 4(e)) or rotated with respect to the stage 25 (see Figure 4(f)). More specifically, configuring each blade 71a-c so that it is longitudinal; configuring the blades 71a-c of the same electrical contact 51a-f so that the blades 71a-c are in parallel; and configuring each blade 71a-c such that it comprises a planar surface 13, each facilitate the pins 11a-f of the chip 29 to establish the required electrical connections. For example, the provision of a planar surface 13 facilitates the pins 11a-f of the chip 29 in establishing the required electrical connections, as the planar surface 13 increases the contact area available which can be used to establish electrical contact with a blade 71a-c. Similarly, the longitudinal configuration of each blade 71a-c increases the dimension of the blades 71a-c along the X-axis, accordingly the pins 11a-f of chip 29 can still contact the blades 71a-c even when the chip

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29 is displaced along the X-axis. The parallel configuration of the blades 71a-c is advantageous as it enables the establishment of the required electrical connections even when the chip 29 is displaced along the X-axis.

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Thus, the chip 29 can still be tested even when it has been off-set, from the ideal testing position, along the X-axis, or rotated relative to the stage 25 so that it is no longer in the ideal testing position.

10 Advantageously, as illustrated in Figures 4b-c, the configuration of the electrical contacts 51a-f, further facilitate the pins 11a-f of the chip 29 in establishing electrical connection between two of the three blades 71a-c in each electrical contact 51a-f, when the chip 29 is off-set along the Y-axis. More specifically, configuring the electrical contacts 51a-f
15 to comprise a third blade, facilitates the pins 11a-f of the chip 29 in establishing electrical connection between two of the three blades 71a-c in each electrical contact 51a-f, when the chip 29 is off-set along the Y-axis.

20 As shown in Figure 4(b) the chip 29 to be tested is off-set to in a first direction (right) along the Y-axis. The provision of a third blade 71a-c ensures that when the chip 29 is off-set to the right along the Y-axis, the pins 11a-f of chip 29 can still establish an electrical connection between blades 71b and 71c of each electrical contact 5a-f.

25 Accordingly, blade 71b can be used during testing of the chip 29 to provide the signal supply terminal and blade 71c can be used during testing of the chip 29 to provide the signal sense terminal, or vice versa. Thus, successful testing of the chip 29 can be carried despite the chip 29 having being off-set, from the ideal testing position, along the

Y-axis. As shown in Figure 4(c) the chip 29 to be tested is off-set in a second direction (to the left) along the Y-axis. The provision of a third blade 71a-c, ensures that when the chip 29 to be tested is off-set to the left along the Y-axis, the pin 11a-f of chip 29 can establish an electrical connection between blades 71a and 71b of each electrical contact 51a-c, so that blade 71a can be used to provide the signal supply terminal during testing of the chip 29 and the blade 71b can provide the signal sense terminal during testing of chip 29, or vice versa. Successful testing of the chip 29 can thus be carried even when the chip 29 is off-set to the left along the Y-axis, from its ideal testing position. Thus, the configuring the electrical contacts 51a-c so that they comprise three or more blades, ensures that the chip 29 can still be tested even when it has been off-set along the Y-axis, X-axis or rotated relative to the stage 25 or platform 100.

Figure 5a provides a plan view of a test machine component 110 according to the present invention. The test machine component 110 comprises a holder member 101 which holds three electrical contacts 103a-c in a fixed position relative to one another. Figure 5b provides a magnified view of the electrical contacts 103a-c. Each of the three electrical contacts 103a-c is connected the holder member 101 by root members 109a-i. Optionally, the three electrical contacts 103a-c may be integral to the holder member 101. Each of the root members 109a-i taper, from the holder member 101 to form blades 107a-c. Each of the three electrical contacts 103a-c comprises three blades 107a-c. Each blade 107a-c has a longitudinal "I" configuration and each of the three blades 107a-c are parallel. Furthermore, each of the three blades 107a-c comprises a planar surface 8.

One or more of the test machine components 110 can be connected to a test machine (not shown) to define a platform on the test machine which is similar to the platform 100 depicted in Figure 3. The holder member 101 further comprises guide means, in the form of holes
5 105a-d. The holes 105a-d facilitate the user when correcting the test machine component 110 to a test machine. For example, when connecting the test machine component 110 to the test machine, each hole 105a-d may receive a pin or screw which is on the test machine so as to guide and secure the holder member 101 towards the correct
10 position on the test machine.

Various modifications and variations to the described embodiments of the invention will be apparent to those skilled in the art without departing from the scope of the invention as defined in the appended
15 claims. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiment.

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Claims:

- 5 1. An electrical contact comprising three or more blades so as to facilitate the establishment of an electrical connection between at least two of the three or more blades, by an electrical contact of a component.
- 10 2. An electrical contact according to claim 1 wherein, the three or more blades extend longitudinally.
3. An electrical contact according to claim 1 or 2 wherein, the three or more blades are arranged in parallel.
- 15 4. An electrical contact according to any preceding claim wherein, some or all of the three or more blades comprise a planar surface.
- 20 5. An electrical contact according to claim 4 wherein, the planar surface is configured such that it is parallel to a plane of an electrical component which is in operable co-operation with electrical contact.
- 25 6. An electrical contact according to any preceding claim wherein, the three or more blades are arranged to define two or more isolation channels which are configured to electrically isolate each of the three or more blades from one another.

- 5 7. An electrical contact according to claim 6 wherein the width of each of the three or more blades is such that the combined width of two of the two or more isolation channels plus the width of a single blade, is less than the width of an electrical contact of an electrical component
- 10 8. An electrical contact according to any preceding claim wherein, some or all of the blades may comprise at least one of gold, a noble metal, BeNi or BeCu.
- 15 9. An electrical contact according to any preceding claim wherein, some or all of the blades comprise Tungsten.
10. An electrical contact according to any preceding claim wherein, the electrical contact further comprises a holding member which holds the three or more blades so that they are in a fixed position relative to one another.
- 20 11. A testing platform suitable for receiving an electrical component to be tested, wherein the testing platform comprising one or more electrical contacts according to any one of claims 1- 10.
- 25 12. A testing platform according to claim 11 wherein at least some of the one or more electrical contacts are arranged in the same orientation.
13. A test machine component, comprising a holder member which comprises any one of at least one electrical contact according to

any one of claims 1-10, wherein the test machine component is configured such that it can co-operate with a test machine.

5 14. A test machine component according to claim 13 wherein the test machine comprises a plurality of electrical contacts according to any one of claims 1-10.

10 15. A test machine component according to claim 13 or 14 further comprising a guide means which is configured to facilitate co-operation of the test machine component with the test machine.

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