



**PROCESS FOR COATING FINELY PITCHED EXTERIOR
LEADS OF A SURFACE MOUNTABLE COMPONENT WITH
SOLDER AND PRODUCT FORMED THEREBY**

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Field of the Invention

This invention relates in general to packaging technology of semiconductor devices, and, in particular, to a process for coating exterior
10 leads of a surface mountable semiconductor device with solder and the product formed thereby.

Background of the Invention

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An electronic device typically comprises components soldered onto a substrate. Conventionally, the components are affixed onto the substrate by soldering onto metallized pads formed on the substrate. In the art, the metallized pads are known as solder pads.

20 Prior to soldering components onto solder pads of a substrate, solder paste is typically applied onto the solder pads by using a stencil. Upon removing the stencil, the components are then placed onto the solder pads coated with the solder paste. Components, such as surface mountable components with finely pitched exterior leads, require small solder pads on
25 the substrate. Stenciling to apply solder paste on these small solder pads requires precise alignments between the stencil and the substrate. Small shifts in aligning the stencil with the substrate often cause smearing of the solder paste across solder pads, thereby rendering the stenciling ineffective. Furthermore, commercially available solder paste requires
30 special formulation to improve its physical properties, such as viscosity and granularity, for effective stenciling through small openings.

Alternatively, instead of stenciling solder paste onto solder pads, exterior leads of, for example, a surface mountable semiconductor device are first coated with solder prior to placing the surface mountable
35 semiconductor device onto a substrate. Existing methods for coating finely pitched exterior leads with solder add substantial costs, such as tooling, to achieve the desired coating on the finely pitched exterior leads.



Therefore, a need exists for an economical process to fabricate surface mountable semiconductor devices with finely pitched exterior leads for easier and effective soldering onto the substrate.

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Summary of the Invention

A process for forming a leadframe wherein the leadframe is subsequently attached to a component for an electronic device. The process comprising the steps of cladding a metal strip with at least one solder strip and forming the leadframe from the metal strip wherein the leadframe provides a plurality of finely pitched exterior leads for the component and further wherein each of the plurality of finely pitched exterior leads includes a substrate end disposed with solder derived from the at least one solder strip.

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Brief Description of the Drawings

FIG. 1 shows a component placed over a substrate in accordance with a preferred embodiment of the present invention.

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FIG. 2 is a flow diagram of a process for fabricating the component of FIG. 1 in accordance with a preferred embodiment of the present invention.

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FIG. 3 shows a metal strip cladded with at least one solder strip in accordance with the preferred embodiment of the present invention.

FIG. 4 shows the metal strip of FIG. 2 forming a leadframe in accordance with the preferred embodiment of the present invention.

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FIG. 5 shows the leadframe of FIG. 3 attached with a housing for the component of FIG. 1 in accordance with the preferred embodiment of the present invention.



Detailed Description of the Invention

FIG. 1 shows a component placed over a substrate 102 in accordance with a preferred embodiment of the present invention. The component is surface mountable onto the substrate 102 and has a leadframe 104 comprising a plurality of finely pitched exterior leads for coupling circuitry for the component, placed within a housing 106, to the substrate 102. Indicated in FIG. 1 is a lead 108 of the plurality of finely pitched exterior leads with a substrate end 116. At the substrate end 116, the lead 108 has a surface 110 that contacts the substrate 102. Disposed with solder 114, in accordance with the preferred embodiment of the present invention, the substrate end 116 forms a solder joint with the substrate 102 at the surface 110 when the solder 114 melts as a result of applying heat by, for example, reflowing through an oven.

Disposing the solder 114 on the surface 110 of each of the plurality of finely pitched exterior leads in the present invention advantageously overcomes problems in applying solder onto the substrate by methods such as stenciling. Unlike prior art methods, only the surface 110 in the present invention has the solder 114 to form the solder joint for the component.

FIG. 2 is a flow diagram of a process 200 for fabricating the component of FIG. 1 in accordance with the preferred embodiment of the present invention. Results of steps 204, 206, and 208 in the process 200 are shown in FIG. 3, FIG. 4, and FIG. 5, respectively and in accordance with the preferred embodiment of the present invention.

Starting at step 202, the process 200 clads a metal strip 302 with at least one solder strip 304, 306 in step 204. The metal strip 302 with the at least one solder strip is shown in FIG. 3, in accordance with the preferred embodiment of the present invention. Following the step 204 of cladding, step 206 forms the leadframe 104 from the metal strip 302. When formed in accordance with the preferred embodiment of the present invention, the leadframe 104 provides the plurality of finely pitched exterior leads as shown in FIG. 4. Each of the plurality of finely pitched exterior leads has its substrate end 116 disposed with solder derived from the at least one solder strip 304, 306. Thereafter, in step 208, the component is then attached to the leadframe 104. Typically, the housing 106 is first attached and circuitry for the component, such as an integrated circuit chip, is then



placed within the housing 106. When the housing 106, with circuitry enclosed, is fully attached to the leadframe 104, as shown in FIG. 5 in accordance with the preferred embodiment of the present invention, the next step 210 trim and form the plurality of finely pitched exterior leads to
5 remove excess of the metal strip 302 not required to form the plurality of finely pitched exterior leads for the component. The process 200 ends at step 212 and the component, with the plurality of finely pitched exterior leads, is ready for soldering onto the substrate 102.

Cladding, as is known, covers one metal to another metal by bonding.
10 Applied advantageously in the present invention, each of the plurality of finely pitched exterior leads has the solder 114 disposed at the substrate end 116 during formation of the leadframe 104. Hence, cladding the at least one solder strip 304, 306 to the metal strip 302 effectively eliminates stenciling the solder 114 onto the substrate 102. Alternate embodiments of
15 the present invention, although not shown, can support different packaging of surface mountable semiconductor devices, such as Quad Flat Pack (QFP). These alternate embodiments are accommodated by having more of the at least one solder strip 304, 306 cladded according to the different packaging required. Similarly, a single solder strip, embodying the present
20 invention, applies to packaging of surface mountable semiconductor devices having the plurality of finely pitched exterior leads disposed on only one side of the housing 106.

By now it should be appreciated that there has been provided a process for coating finely pitched exterior leads of a surface mountable
25 component with solder and the product formed thereby.

We claim:



CLAIMS

1. A process for fabricating a component with a plurality of finely pitched exterior leads wherein each of the plurality of finely pitched exterior leads includes a coating of solder, the process comprising the steps of:
- 5 cladding a metal strip with at least one solder strip;
forming a leadframe from the metal strip wherein the leadframe provides the plurality of finely pitched exterior leads and further wherein each of the plurality of finely pitched exterior leads includes
- 10 a substrate end disposed with solder derived from the at least one solder strip;
attaching a housing and circuitry for the component to the leadframe; and
removing excess of the metal strip not required to form the
- 15 plurality of finely pitched exterior leads for the component.
2. The process of Claim 1 wherein the step of attaching comprises the step of placing the circuitry within the housing.
- 20 3. A process for forming a leadframe wherein the leadframe is subsequently attached to a component for an electronic device, the process comprising the steps of:
- cladding a metal strip with at least one solder strip; and
forming the leadframe from the metal strip wherein the
- 25 leadframe provides a plurality of finely pitched exterior leads for the component and further wherein each of the plurality of finely pitched exterior leads includes a substrate end disposed with solder derived from the at least one solder strip.
- 30 4. The process of Claim 3 further comprising the step of attaching a housing for the component to the leadframe.
5. The process of Claim 4 further comprising the step of placing circuitry for the component within the housing.





6. A component for affixing onto a substrate for an electronic device, the component comprising:
- circuitry for the component;
 - a housing for the circuitry;
5. a leadframe attached to the housing and forming a plurality of finely pitched exterior leads for coupling the circuitry to the substrate wherein each of the plurality of finely pitched exterior leads comprises:
- a substrate end having a surface that contacts the
- 10 substrate; and
- solder disposed only on the surface.
7. The component of Claim 7 wherein the component comprises a surface mountable semiconductor device.
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