Referring now to FIG. 11B, therein is shown the structure of FIG. 11A having a passive device 1120 in the solder formed after reflow soldering of the solder paste which has been printed or dispensed.

Referring now to FIG. 12A, therein is shown one embodiment of the cross-section of FIG. 11B taken along line 12A--12A. The passive device 1120 is in the lead finger groove 1105 having a bottom 1205 and the solder paste is in the reservoirs 1106 and 1108 having respective bottoms 1206 and 1208. The cross-section shows a vertical thickness of the lead finger 1102. The lead finger groove 1105 is shown as being formed at least halfway through the vertical thickness of the lead finger 1102 with the connected reservoirs 1106 and 1108 being formed in the lead finger 1102 at least halfway through the vertical thickness of the lead finger 1102. After solder reflow, the solder paste is converted into solder in the groove 1105 and the reservoirs 1106 and 1108 that hold the passive device 1120 in the lead finger 1102.

Referring now to FIG. 12B, therein is shown another embodiment of the cross-section of FIG. 11B taken along line 12B--12B. The passive device 1120 is in the lead finger groove 1105 without a bottom and the solder paste is in the reservoirs 1106 and 1108 having respective bottoms 1206 and 1208. The cross-section shows a vertical thickness of the lead finger 1102. The lead finger groove 1105 is shown as being formed all the way through the vertical thickness of the lead finger 1102 with the connected reservoirs 1106 and 1108 being formed in the lead finger 1102 at least halfway through the vertical thickness of the lead finger 1102. After solder reflow, the solder paste is converted into solder in the groove 1105 and the reservoirs 1106 and 1108 that hold the passive device 1120 in the lead finger 1102.

Referring now to FIG. 12C, therein is shown another embodiment of the cross-section of FIG. 11B taken along line 12C--12C. The passive device 1120 is in the lead finger groove 1105 without a bottom and the solder paste is in the reservoirs 1106 and 1108 without bottoms. The cross-section shows a vertical thickness of the lead finger 1102. The lead finger groove 1105 is shown as being formed all the way through the vertical thickness of the lead finger 1102 with the connected reservoirs 1106 and 1108 being formed in the lead finger 1102 all the way through the vertical thickness of the lead finger 1102. After solder reflow, the solder paste is converted into solder in the groove 1105 and the reservoirs 1106 and 1108 that hold the passive device 1120 in the lead finger 1102.

Referring now to FIG. 13, therein is shown a close-up plan view of the passive device 1120 showing solder 1300 filling the gaps between the passive device 1120 and the lead fingers 1100 and 1102. The solder 1300 fills the gap by capillary effect during solder reflow.

Referring now to FIG. 14, therein is shown a method 1400 for forming an integrated circuit package in accordance with the present invention. The method 1400 comprises: a block 1402 of providing a leadframe having lead fingers; a block 1404 of forming a groove in a lead finger; in a block 1406 of placing a conductive bonding agent in the groove; and a block 1408 of placing an electronic device in the groove to be held by the conductive bonding agent.

While the invention has been described in conjunction with a specific best mode, it is to be understood that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the aforegoing description. Accordingly, it is intended to embrace all such alternatives, modifications, and variations which fall within the spirit and scope of the included claims. All matters set forth herein or shown in the accompanying drawings are to be interpreted in an illustrative and non-limiting sense.

THE INVENTION CLAIMED IS:

1. An integrated circuit package, comprising:

~~a leadframe having~~ a lead finger having a horizontal length, a horizontal width, and a vertical thickness, the lead finger having a groove formed therein at least halfway through the vertical thickness with a connected reservoir formed therein at least halfway through the vertical thickness ~~a groove provided therein~~;

a conductive bonding agent in the groove and the connected reservoir; and

an electronic device in the groove to be held to the lead finger by the conductive bonding agent in the groove and in the connected reservoir.

2. The integrated circuit package as claimed in claim 1 wherein the lead finger has a tip of at least one of the configurations of straight, increased width, side extension, flared, offset, extended, or a combination thereof.

3. The integrated circuit package as claimed in claim 1 further comprising the lead finger formed into an external lead around at least a portion of the integrated circuit package.

4. The integrated circuit package as claimed in claim 1 wherein: ~~the lead finger groove includes~~the connected ~~a~~ reservoir ~~for the conductive bonding agent~~ is adjacent to ~~the lead finger~~ a corner of the groove; and ~~.~~

the groove has a second connected reservoir adjacent to a further corner of the groove for containing the conductive bonding agent.

5. The integrated circuit package as claimed in claim 1 further comprising:

a leadframe paddle having ~~a~~the groove provided therein;

a conductive bonding agent in the groove; and

the electronic device in the groove to be held by the conductive bonding agent.

6. The integrated circuit package as claimed in claim 1 further comprising:

an integrated circuit die bonded by at least one of wire or ball to the lead finger; and

at least one of a solder bump or a ball grid array ball formed on the lead finger.

7. An integrated circuit package, comprising:

~~a leadframe having~~ lead fingers having horizontal lengths, horizontal widths, and vertical thicknesses, the lead fingers extending ~~at least one of~~ parallel,

perpendicular, and a combination thereof one to another, ~~the~~a pair of lead fingers having blind or through grooves formed therein at least halfway through the vertical thicknesses with ~~and~~ connected reservoirs formed therein at least halfway through the vertical thicknesses; ~~provided therein;~~

a conductive bonding agent in the blind or through grooves; and

a passive device in the blind or through grooves to be held to the lead finger by the conductive bonding agent in the grooves and in the connected reservoirs, the passive device extending between the pair of lead fingers.

8. The integrated circuit package as claimed in claim 7 wherein:

the lead fingers have tips of at least one of the configurations of straight, increased, side extension, flared, offset, extended, or a combination thereof;

the passive device includes a small, medium, or large passive device connected between two of the lead fingers; and

the blind or through grooves are formed proximate the tips of the lead fingers.

9. The integrated circuit package as claimed in claim 7 further comprising:

the lead fingers formed into external leads around at least a portion of the integrated circuit package; and

an additional passive device on one of the external leads exterior to the integrated circuit package.

10. The integrated circuit package as claimed in claim 7 wherein: ~~the blind or through grooves include at least two blind or through reservoirs for the conductive bonding agent adjacent to each of the blind or through grooves~~ the connected reservoirs are adjacent to a corner of the grooves; and

the grooves have a second connected reservoir adjacent to a further corner of the grooves for containing the conductive bonding agent .

11. The integrated circuit package as claimed in claim 7 further comprising:

a leadframe paddle having at least a groove, a notch, or a relief provided therein;

a conductive bonding agent in at least the groove, the notch, the relief, or a combination thereof; and

at least the passive device in the groove, the notch, the relief, or a combination thereof is held by the conductive bonding agent between at least one of the lead fingers and the leadframe paddle, the integrated circuit die and the groove, the notch, the relief, or a combination thereof.

12. The integrated circuit package as claimed in claim 7 further comprising:

an integrated circuit die bonded by at least one of a wire or ball to the lead finger;

an encapsulant encapsulating the integrated circuit die and the lead finger; and

at least one of a solder bump or a ball grid array ball formed on the lead finger outside the integrated circuit package.