Referring now to FIG. 1, therein is shown a top view of an integrated circuit package system 100 in a first embodiment of the present invention. The top view depicts a shield 102 covering the integrated circuit package system 100. A central horizontal portion 104 of the shield 102 is higher than a perimeter horizontal portion 106 adjacent to the four edges of the integrated circuit package system 100. Between the central horizontal portion 104 and the perimeter horizontal portion 106 may be a non-horizontal portion 108.

Referring now to FIG. 2, therein is shown a cross-sectional view of the integrated circuit package system 100 along line 2--2 of FIG. 1. The cross-sectional view depicts an integrated circuit die 210 mounted over a die-attach pad 212 with an adhesive 214, such as a die-attach adhesive, and a first lead 216. An encapsulation 218, such as an epoxy molding compound, covers the integrated circuit die 210 and the first lead 216. The shield 102 conformally covers a top surface of the encapsulation 218.

The shield 102 can be formed from a number of different conductive materials. For example, the shield 102 can be formed from metal, conductive resin, foil and conductive film. The shield 102 may connect to a ground reference or a reference at other voltage levels to provide electromagnetic interference (EMI) shielding for the integrated circuit package system 100.

A portion of the first lead 216 is half-etched from a top side 220 of the first lead 216 to form a ~~lower~~ stepped down portion 222 such that the encapsulation 218 can be between the ~~lower~~ stepped down portion 222 of the first lead 216 and the shield 102. The encapsulation 218 can prevent electrical shorting between the shield 102 and the first lead 216 because the step down portion 222 is shorter than a planar sidewall of the encapsulation 218. The encapsulation 218 is formed to be coplanar with the first lead 216 on a horizontal bottom includes a vertical end with the first lead 216 exposed from and coplanar with the planar sidewall of the encapsulation 218. The shield 102 can include an outer edge facing away from the integrated circuit die 210 and coplanar with the planar sidewall of the encapsulation 218.

The integrated circuit die 210 has a non-active side 224 and an active side 226, wherein the active side 226 includes active circuitry fabricated thereon. In this example, the non-active side 224 preferably faces the die-attach pad 212. The die-attach pad 212 is coplanar with the first lead 216. Internal interconnects 228, such as bond wires or ribbon bond wires, may connect between the active side 226 and the die-attach pad 212, and between the active side 226 and the first lead 216.

For illustrative purposes, both the first lead 216 and the die-attach pad 212 are shown connected to the same bond pad on the active side 226. Although, it is understood that the die-attach pad 212 and the first lead 216 may not connect to the same location on the active side 226. For example, the die-attach pad 212 may electrically connect to a ground reference and the first lead 216 may connect to a different bond pad on the integrated circuit die 210.

Referring now to FIG. 3, therein is shown a cross-sectional view of the integrated circuit package system 100 along line 3--3 of FIG. 1. The cross-sectional view depicts the integrated circuit die 210 mounted over the die-attach pad 212 with the adhesive 214 and over a corner lead 330. The encapsulation 218 is over the integrated circuit die 210 and the corner lead 330.

The corner lead 330 extends from the die-attach pad 212. A portion of the corner lead 330, at the opposite end of the die-attach pad 212, is preferably exposed from the encapsulation 218. The shield 102 is formed over the exposed end of the corner lead 330 and preferably electrically connects to the corner lead 330. In this example, the shield 102 may connect to a ground reference through the corner lead 330 and the die-attach pad 212 to provide EMI shielding for the integrated circuit package system 100.

Referring now to FIG. 4, therein is shown a cross-sectional view of the integrated circuit package system 100 along line 4--4 of FIG. 1. The cross-sectional view depicts the integrated circuit die 210 mounted over the die-attach pad 212 and a second lead 432. The encapsulation 218 is over the integrated circuit die 210, the die-attach pad 212, and the second lead 432.

A top portion of the second lead 432 is preferably exposed from the encapsulation 218. The shield 102 is formed over the top portion of the second lead 432 and preferably electrically connects to the second lead 432. In this example, the shield 102 may connect to a ground reference or a reference at other voltage levels through the second lead 432 to provide EMI shielding for the integrated circuit package system 100. The shield 102 is directly on the top portion of the second lead 432. The outer edge of the shield 102 can be coplanar with an outer edge of the second lead 432 and the planar sidewall of the encapsulation 218.

It has also been discovered that in the present invention provides a flexible EMI structural and manufacturing while providing a low package height, low cost, and improved yield. Half-etching of the first leads allows isolation of the first leads from the conformal shield over the encapsulation. This allows the first leads to be used for other functions, such as signal leads, and not constrained to provide reference for the shield. The corner leads, the second leads, or a combination thereof may provide the ground connection for the shield providing the EMI function.

Referring now to FIG. 5, therein is shown a top view of a portion of a lead frame 502 for forming the integrated circuit package system 100 of FIG. 1. The plan view depicts the

die-attach pad 212, a tie bar 534, a dam bar 536 the first lead 216, and the second lead 432. The first lead 216 and the second lead 432 extends from the dam bar 536. The first lead 216

What is claimed is:

1. A~~n~~ method of manufacturing an integrated circuit package system comprising:

forming a first lead;

forming ~~and~~ a second lead, the second lead having an outer end and a top portion, the top portion ~~portionside,~~ adjacent to the first lead;

connecting an integrated circuit die ~~with~~to the first lead;

forming an encapsulation ~~over~~ on the integrated circuit die, the first lead, and the second lead, the encapsulation having a planar sidewall;~~with a portion of a top side of the second lead exposed;~~ and

forming a shield over the top surface of the encapsulation, ~~the first lead, and the second lead with the shield not in contact with the first lead~~ the shield isolated from the first lead by the encapsulation, the shield being directly formed on the top portion of the second lead, and wherein the shield includes an outer edge facing away from the integrated circuit die, the outer edge of the shield being coplanar with the outer end of the second lead and the planar sidewall of the encapsulation.

2. The ~~system~~ method as claimed in claim 1 wherein:

forming the first lead includes:

forming a ~~lower~~stepped down portion ~~at the top side~~ of the first lead; and

forming the shield includes:

forming the shield over the ~~lower~~stepped down portion with the encapsulation in between.

3. The ~~system~~ method as claimed in claim 1 wherein forming the shield over the second lead includes forming the shield on the second lead.

4. The ~~system~~ method as claimed in claim 1 further comprising:

forming a corner lead; and

wherein forming the shield includes:

forming the shield over the corner lead.

5. The ~~system~~ method as claimed in claim 1 further comprising connecting the shield to a reference level.

6. A~~n~~ method of manufacturing an integrated circuit package system comprising:

forming a first lead ~~and a second lead~~;

forming a second lead, the second lead having an outer end and a top portion, the top portion adjacent to the first lead;

connecting an integrated circuit die ~~with~~to the first lead;

forming an encapsulation ~~over~~ on the integrated circuit die, the first lead, and the second lead, ~~with a portion of a top side of the second lead exposed;~~

~~coating a shield over the encapsulation, the first lead, and the second lead with the shield not in contact with the first lead~~ the encapsulation having a planar sidewall; ~~and~~

forming a shield over top surface of the encapsulation, the shield isolated from the first lead by the encapsulation, the shield being directly formed on the top portion of the second lead, and wherein the shield includes ~~having~~ an outer edge facing away from the integrated circuit die, the outer edge of the shield being ~~die~~ coplanar with the outer end ~~edge~~ of the second lead and the planar sidewall of the encapsulation; and

connecting the shield to a reference level coupled with the second lead.

7. The ~~system~~ method as claimed in claim 6 wherein forming the shield includes forming the shield conformal to a top surface of the encapsulation.

8. The ~~system~~ method as claimed in claim 6 further comprising:

forming a corner lead; and

wherein forming the shield includes:

forming the shield on the corner lead coupled to a ground reference.

9. The ~~system~~method as claimed in claim 6 wherein connecting the shield to the reference level coupled with the second lead includes connecting the shield on the second lead coupled to a ground reference.

10. The ~~system~~ method as claimed in claim 6 wherein:

forming the first lead includes:

forming a die-attach pad having a corner lead extended therefrom;

forming the shield includes:

forming the shield on the corner lead; and

connecting the integrated circuit die includes:

connecting the integrated circuit die and the second lead.

11. An integrated circuit package system comprising:

a first lead;

a second lead, the second lead having an outer end and a top portion, the top portion adjacent to the first lead;

an integrated circuit die connected ~~with~~to the first lead;

an encapsulation ~~over~~on the integrated circuit die, the first lead, and the second lead, the encapsulation having a planar sidewall;~~with a portion of a top side of the second lead exposed;~~ and

a shield over the top surface of the encapsulation, the shield isolated from the first lead by the encapsulation, the shield being directly formed on the top portion of the second lead, and wherein the shield includes an outer edge facing away from the integrated circuit die, the outer edge of the shield being ~~die~~ coplanar with the outer end of the second lead and the planar sidewall of the encapsulation~~the first lead, and the second lead with the shield not in contact with the first lead~~.

12. The system as claimed in claim 11 wherein:

the first lead includes a ~~lower~~ stepped down portion ~~at the top side~~ of the first lead; and

the shield includes the shield over the ~~lower~~ stepped down portion with the encapsulation in between.

13. The system as claimed in claim 11 wherein the shield is on the second lead.

14. The system as claimed in claim 11 further comprising:

a corner lead; and

wherein the shield includes:

the shield over the corner lead.