CLAIMS

What is claimed is:

1. A device comprising:

a hybridized device having a top surface and a bottom surface;

a packaging substrate comprising a metal inlay in an opening in the packaging substrate and a plurality of conductive vias, the metal inlay thermally coupled to the bottom surface of the hybridized device;

at least 27 passive components on a top surface of the packaging substrate;

a plurality of conductive contacts on a bottom surface of the packaging substrate, each electrically coupled to one of the plurality of conductive vias; and

a plurality of conductive connectors electrically coupled between the top surface of the hybridized device and the top surface of the packaging substrate, each of the plurality of conductive connectors electrically coupled to a respective one of the plurality of conductive contacts on the bottom surface of the packaging substrate by a respective one of the conductive vias, and at least some of the plurality of conductive connectors electrically coupled to at least one of the passive components.

2. The device of claim 1, wherein the hybridized device comprises a silicon backplane and a monolithic array on the silicon backplane, the monolithic array comprising a plurality of light-emitting segments.

3. The device of claim 2, wherein the silicon backplane comprises a plurality of drivers, one of the plurality of drivers being electrically coupled to provide a drive current to one or a subset of the plurality of light-emitting segments.

4. The device of claim 2, wherein the plurality of light-emitting segments comprises at least 20,000 light-emitting segments spaced 20 μm or less apart.

5. The device of claim 1, further comprising a layer of a thermally conductive metal material between a top surface of the metal inlay and the bottom surface of the hybridized device.

6. The device of claim 1, wherein the metal inlay comprises a single body of a copper material embedded in the packaging substrate.

7. The device of claim 1, wherein the plurality of conductive contacts on the bottom surface of the packaging substrate are interfaces to an external control board.

8. The device of claim 1, further comprising a light-blocking encapsulant completely covering the plurality of conductive connectors, wherein the light-blocking encapsulant is one of silicone or epoxy with a carbon filler.

9. The device of claim 1, further comprising at least one metallization layer on the top surface of the packaging substrate electrically coupled between the plurality of conductive connectors and the plurality of conductive vias.

10. A device comprising:

a control board having a top surface, a bottom surface, a plurality of first conductive contacts on the top surface of the control board and a first metal inlay in an opening in the top surface of the control board; and

a light-emitting device package comprising a hybridized device on a top surface of a packaging substrate, a plurality of second conductive contacts on a bottom surface of the packaging substrate, a second metal inlay embedded in the top surface of the packaging substrate, at least 27 passive components on a top surface of the packaging substrate, a plurality of metal connectors electrically coupled between the a top surface of the hybridized device and a top surface of the light-emitting package such that at least some of the plurality of metal connectors are electrically coupled between the top surface of the hybridized device and at least one of the plurality of passive components,

the bottom surface of the packaging substrate being disposed on the top surface of the control board with the first conductive contacts on the top surface of the control board electrically coupled to the second conductive contacts on the bottom surface of the packaging substrate.

11. The device of claim 10, wherein the packaging substrate further comprises:

a plurality of conductive vias, each of the plurality of conductive vias electrically coupled between a respective one of the plurality of metal connectors and a respective one of the plurality of second conductive contacts on the bottom surface of the packaging substrate.

12. The device of claim 11, wherein the plurality of metal connectors are one of wires, ribbon wires and flexible circuits.

13. The device of claim 11, further comprising a light-blocking encapsulant completely covering the plurality of conductive connectors, wherein the light-blocking encapsulant is one of silicone or epoxy with a carbon filler.

14. The device of claim 10, wherein the hybridized device comprises a silicon backplane and a monolithic array on the silicon backplane, the monolithic array comprising a plurality of light-emitting segments.

15. The device of claim 14, wherein the silicon backplane comprises a plurality of drivers, one of the plurality of drivers being electrically coupled to provide a drive current to one or a subset of the plurality of light-emitting segments.

16. The device of claim 14, wherein the plurality of light-emitting segments comprises at least 20,000 light-emitting segments spaced 20 μm or less apart.

17. The device of claim 10, further comprising a layer of a thermally conductive metal material between a top surface of the metal inlay and the bottom surface of the hybridized device.

18. The device of claim 10, wherein the metal inlay comprises a single body of a copper material embedded in the packaging substrate.