CLAIMS:

1. A handheld communication device, comprising:

a first assembly, including:

a rigid portion including a first array of antenna patches, a first set of printed circuit board (PCB) layers, and an integrated circuit (IC) die, wherein the IC die is proximate to a first face of the first set of PCB layers, the first array of antenna patches is proximate to a second face of the first set of PCB layers, the first face is opposite to the second face, a face of the first array of antenna patches is proximate to a side of the handheld communication device, and the first array of antenna patches includes four antenna patches,

a flexible portion coupled to the rigid portion, wherein a thickness of the flexible portion is less than a thickness of the rigid portion, and

a shield above and extending past side faces of the IC die; and

a second assembly, including:

a second array of antenna patches, wherein a face of the second array of antenna patches is oriented perpendicular to the face of the first array of antenna patches, the face of the second array of antenna patches faces a back of the handheld communication device, and the second array of antenna patches includes four antenna patches.

2. The handheld communication device of claim 1, further comprising:

a display.

3. The handheld communication device of claim 2, wherein the face of the first array of antenna patches is oriented perpendicular to the display.

4. The handheld communication device of claim 2, wherein the display includes a touchscreen display.

5. The handheld communication device of claim 2, wherein the display and the back are at opposite faces of the handheld communication device.

6. The handheld communication device of claim 1, wherein the face of the first array of antenna patches is substantially parallel to a side of the handheld communication device.

7. The handheld communication device of claim 1, wherein the first array of antenna patches includes more than four antenna patches.

8. The handheld communication device of claim 1, wherein the IC die is a first IC die, and the second assembly includes:

a second set of PCB layers; and

a second IC die, wherein the second IC die is proximate to a first face of the second set of PCB layers, the second array of antenna patches is proximate to a second face of the second set of PCB layers, and the first face of the second set of PCB layers is opposite to the second face of the second set of PCB layers.

9. The handheld communication device of claim 1, further comprising:

a window in a portion of the handheld communication device, wherein the second array of antenna patches is proximate to the window.

10. The handheld communication device of claim 9, wherein the window has an area between 50 square millimeters and 200 square millimeters.

11. The handheld communication device of claim 1, wherein an axis of the first array is perpendicular to an axis of the second array.

12. The handheld communication device of claim 1, wherein the first array is an array of millimeter wave antenna patches.

13. The handheld communication device of claim 1, wherein the second array is an array of millimeter wave antenna patches.

14. The handheld communication device of claim 1, further comprising:

an air cavity between the second array of antenna patches and the back.

15. The handheld communication device of claim 1, wherein the first array of antenna patches includes two parallel arrays of antenna patches.

16. The handheld communication device of claim 1, wherein the second array of antenna patches includes two parallel arrays of antenna patches.

17. A handheld communication device, comprising:

a first assembly, including:

a rigid portion including a first array of antenna patches, a first set of printed circuit board (PCB) layers, and an integrated circuit (IC) die, wherein the IC die is proximate to a first face of the first set of PCB layers, the first array of antenna patches is proximate to a second face of the first set of PCB layers, the first face is opposite to the second face, the first array of antenna patches is proximate to a side of the handheld communication device, and the first array of antenna patches includes four antenna patches,

a flexible portion coupled to the rigid portion, wherein a thickness of the flexible portion is less than a thickness of the rigid portion, and

a shield above and extending past side faces of the IC die; and

a second assembly, including:

a second array of antenna patches, wherein the second array of antenna patches is oriented perpendicular to the first array of antenna patches, the second array of antenna patches faces a back of the handheld communication device, and the second array of antenna patches includes four antenna patches.

18. The handheld communication device of claim 17, further comprising:

a display.

19. The handheld communication device of claim 17, wherein the first array of antenna patches is substantially parallel to a side of the handheld communication device.

20. The handheld communication device of claim 17, wherein the IC die is a first IC die, and the second assembly includes:

a second set of PCB layers; and

a second IC die, wherein the second IC die is proximate to a first face of the second set of PCB layers, the second array of antenna patches is proximate to a second face of the second set of PCB layers, and the first face of the second set of PCB layers is opposite to the second face of the second set of PCB layers.

21. The handheld communication device of claim 17, further comprising:

a window in a portion of the handheld communication device, wherein the second array of antenna patches is proximate to the window.

22. The handheld communication device of claim 17, wherein an axis of the first array is perpendicular to an axis of the second array.

23. A method of manufacturing a handheld communication device, comprising:

forming a first assembly, including:

a rigid portion including a first array of antenna patches, a first set of printed circuit board (PCB) layers, and an integrated circuit (IC) die, wherein the IC die is proximate to a first face of the first set of PCB layers, the first array of antenna patches is proximate to a second face of the first set of PCB layers, the first face is opposite to the second face, and the first array of antenna patches includes four antenna patches,

a flexible portion coupled to the rigid portion, wherein a thickness of the flexible portion is less than a thickness of the rigid portion, and

a shield above and extending past side faces of the IC die; and

forming a second assembly, including:

a second array of antenna patches, wherein the second array of antenna patches is oriented perpendicular to the first array of antenna patches, and the second array of antenna patches includes four antenna patches; and

assembling the first assembly and the second assembly into the handheld communication device, wherein the first array of antenna patches is proximate to a side of the handheld communication device, and the second array of antenna patches faces a back of the handheld communication device.

24. The method of claim 23, further comprising:

assembling a display into the handheld communication device.

25. The method of claim 23, wherein an axis of the first array is perpendicular to an axis of the second array in the handheld communication device.