

CLAIMS

1. A low profile array (LPA) comprising:
an antenna element array layer having at least one Faraday wall; and
a beamformer circuit layer coupled to the antenna element array layer, the beamformer circuit layer having at least one Faraday wall, wherein the Faraday walls extend between ground planes associated with at least one of the antenna element array layer and the beamformer circuit layer.
2. The LPA according to claim 1, wherein the LPA has a total thickness of less than about 47 mils.
3. The LPA according to claim 1, wherein the antenna element array layer further has a substrate, a conductor applied on the substrate, and a radiator is formed by removing conductive material and printing a conductor to create the radiator.
4. The LPA according to claim 3, wherein the at least one Faraday wall of the antenna element array layer is created by forming a trench that is back-filled with a conductive material.
5. The LPA according to claim 3, wherein the at least one Faraday wall of the beamformer circuit layer is created by forming a trench that is back-filled with a conductive material.
6. The LPA according to claim 3, further comprising a vertical launch that extends through the radiator of antenna element array layer and the beamformer circuit layer.
7. The LPA according to claim 6, wherein the vertical launch is created by soldering pads on the radiator and the beamformer circuit layer prior to bonding so a solder bump is present on the surface of the beamformer circuit, drilling a center conductor hole, and filling the center conductor hole with copper.

8. The LPA according to claim 6, further comprising a logic circuit layer disposed below the beamformer circuit layer.
9. The LPA according to claim 8, further comprising a phase shift layer disposed below the logic circuit layer.
10. The LPA according to claim 9, wherein the vertical launch extends through the logic circuit layer and the phase shift layer.
11. An array antenna comprising a plurality of LPAs, each LPA embodying the LPA set forth in claim 1.
12. The array antenna of claim 11, comprising four LPAs arranged such that the first set of tuning elements of an LPA and a first set of tuning elements of a second LPA are respectively adjacent to a second set of tuning elements of a third LPA and a second set of tuning elements of a fourth LPA.
13. A method of fabricating a low profile array (LPA), the method comprising:
milling trenches in a portion of an array having antenna elements and filling the trenches with a conductive material using additive manufacturing processing to form Faraday wall; and
milling trenches in a beamformer substrate and filling the trenches with a conductive material using additive manufacturing processing to form Faraday walls.
14. The method according to claim 13, wherein the LPA has a total thickness of less than about 47 mils.
15. The method according to claim 13, wherein an antenna element array layer of the array has a substrate, a conductor applied on the substrate, and a radiator is formed by removing conductive material and printing a conductor to create the radiator, the Faraday wall being created by forming a trench that is back-filled with a conductive material.

16. The method according to claim 13, further comprising providing a vertical launch that extends through the radiator of antenna element array layer and the beamformer circuit layer.
17. The method according to claim 16, wherein the vertical launch is created by soldering pads on the radiator and the beamformer circuit layer prior to bonding so a solder bump is present on the surface of the beamformer circuit, drilling a center conductor hole, and filling the center conductor hole with copper.
18. The method according to claim 16, wherein the LPA includes a logic circuit layer disposed below the beamformer circuit layer.
19. The method according to claim 18, wherein the LPA further includes a phase shift layer disposed below the logic circuit layer.
20. The method according to claim 19, wherein the vertical launch extends through the logic circuit layer and the phase shift layer.