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(54) **Title:** ELECTRONIC DEVICE WITH THREE-DIMENSIONAL ON-CHIP INDUCTORS

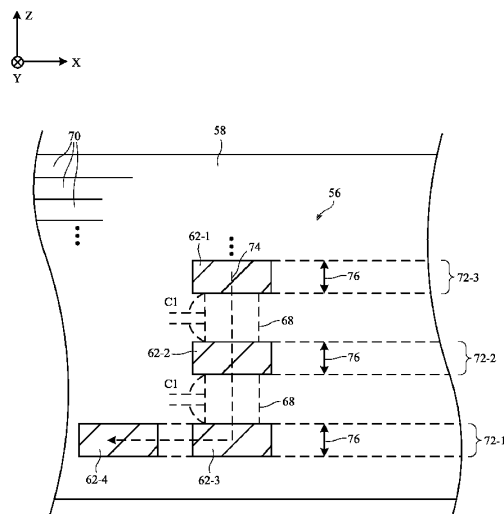


FIG. 4

(57) **Abstract:** An electronic device may include wireless circuitry. The wireless circuitry may include inductors. The inductors may include an on-chip three-dimensional (3D) inductor. The 3D inductor may include a stack of windings in different metallization layers of the substrate. The 3D inductor may include at least one additional winding formed from at least one of the same metallization layers as the stack of windings. The at least one additional winding may laterally surround at least one of the windings from the stack of windings. The stack of windings may be vertically aligned or staggered. The at least one additional winding may be arranged in a vertically aligned stack or a staggered stack. Two or more stacks of windings may be separated by a winding between the stacks. The inductor may occupy a minimal amount of area while minimizing fringing capacitance, thereby optimizing quality factor and self-resonance frequency.

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WO 2025/064101 A1

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