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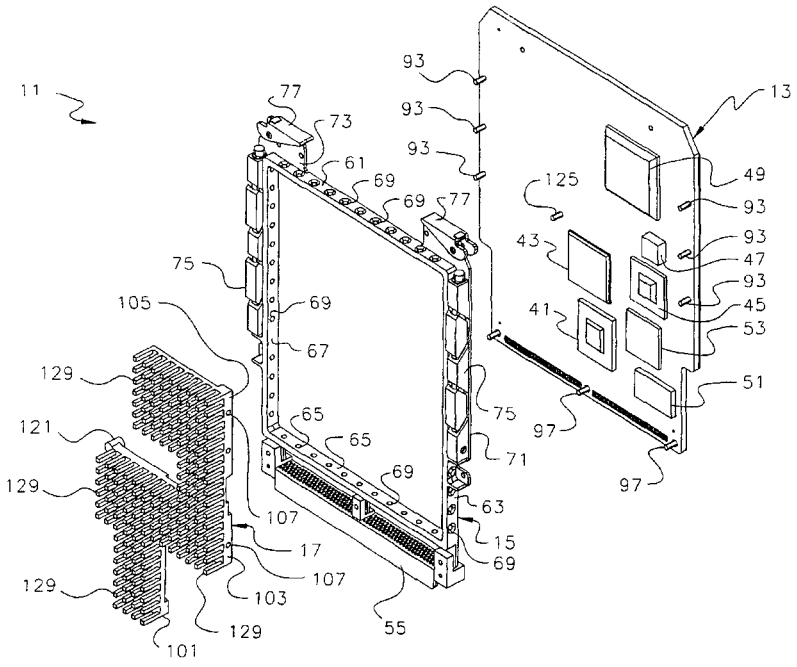
(54) Title: INTEGRATED CONVECTION AND CONDUCTION HEAT SINK FOR MULTIPLE MOUNTING POSITIONS



(57) Abstract: An integrated thermal management system for electronic devices includes a printed wiring board (13) for supporting electronic devices, at least one die-up (41-49) and one die-down electronic device (51, 53), a frame (15) and a heat sink (17). The board (13) includes at least one thermally conductive layer (25, 31), to which the die-down device (51, 53) is thermally connected. The frame member (15), which includes at least a first heat sink mounting location, is connected to one of the first (63) and second surfaces (65) of the board (13), adjacent to the edge. The heat sink (17) itself, which is cantilevered over the die-up electronic device (41-49) from at least one heat sink mounting location (63, 65), includes a portion (111, 119) which is adapted to engage the die-up electrical device (41-49), a portion (63, 65) connected to the frame member (15) to provide a conductive path from the die-up device (41-49) to the frame member (15), and a convective cooling portion (129). The thermal management structure also includes a cold wall (169, 171), which engages the frame (15) to provide a thermally conductive connection between the frame member (15) and the cold wall (169, 171). The heat sink(s) (17) covers only the die-up electronic device(s) (41-49) and those portions of the board surface(s) between the die-up electronic device(s) (41-49) and the the frame necessary to thermally connect the die-up electronic device(s) (41-49) to the frame (15), to thereby provide access to the board surfaces for inspection or testing without removal of the heat sink(s) (17).

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