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(57) **ABSTRACT**

A supply modulator including a multiple output voltage regulator (MOVR) configured to output voltages in a discrete level-envelope tracking mode (DLETM) having different levels from each other respectively corresponding to reference output voltage signals, a switching regulator configured to output a switching regulator voltage, an output voltage being based on the switching regulator voltage and a selected voltage among the voltages in the DLETM and based on the switching regulator voltage in an average power tracking mode, a switching regulator controller configured to sense an output current of the MOVR to obtain a sensing value, and control the switching regulator based on the sensing value in the DLETM, a switch array comprising switches respectively corresponding to the voltages and configured to selectively connect the selected voltage to a power amplifier by performing a switching operation, and a switch controller configured to control the switching operation.

