Chapter 10. High-Frequency Soldering Technology in Electronics

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Abstract: The issues of selecting the frequency and power of high-frequency heating in soldering electronic modules and device enclosures are thoroughly examined. High-frequency electromagnetic energy is explored for its efficient non-contact heating capabilities, enabling rapid heating to soldering temperatures through the induction of eddy currents in the metal components and solder. Compared to convective heat sources, high-frequency heating can achieve heating rates up to 10 times faster, with the heating zone precisely localized within the area defined by the inductor design. Methods and device schematics for high-frequency soldering processes are provided, alongside descriptions of the technological equipment and fixtures utilized in these processes. Transistor generators operating at medium (66 kHz) and high frequencies (440 and 1760 kHz) have gained widespread adoption for high-frequency heating applications. To enhance the quality of solder joints and increase product yield, computer-controlled thermal profiles are essential for high-frequency soldering processes. The advantages of high-frequency heating, including locality, simplicity of design, high environmental cleanliness, and the ability to leverage electromagnetic forces for improving solder flow, make it an optimal choice for surface mounting of electronic modules. Induction devices constructed on magnetic cores are also viable for soldering power contacts, connectors,

and wires to printed circuit boards, coaxial cables, and sealing metal-glass housings of integrated circuits. These applications highlight the versatility and efficacy of high-frequency heating techniques in modern electronic assembly processes.

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