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Wireless Power Transmission Technologies and Application (2)

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# SURVEY OF HIGH-POWER MICROWAVE COMPONENTS FOR SPECIFIC WIRELESS POWER TRANSFER APPLICATIONS

**Abstract**

Wireless Power Transfer (WPT) requires affordable components. This study explores the cost model for transmitter components as a function of power density and array size, at frequencies of 2.45 and 5.8 GHz. Phased array antennas (PAAs) for transmit may be individually-controlled elements, or a corporate-feed architecture with large microwave power sources serving multiple antenna elements. Rectifying receiving antenna (rectennae) individual elements may be combined in series to boost voltage, in parallel to boost current, or a hybrid combination to meet specific power bus requirements. As the power density increases, additional considerations complicate PAA design, including power routing complexity, thermal management, and the cost, size, and mass of individual devices. Larger PAA achieve higher gain, and produce lower sidelobe levels, but require more structural support and consume more surface area on land or on a mobile conveyance. Power management and distribution of both the transmit and receive/rectify antenna adds mass, volume, and cost with higher power WPT. Several breakpoints are identified, and design options favored, for specific applications of WPT, ranging from recharging mobile devices across a room (Watts) to space power satellites (GW). Commercially-available components are considered. This survey concludes with recommendations for product development in the burgeoning WPT industry.