Element efficiency and noise in grid arrays

The element efficiency of a phased array is the ratio of the radiated-to-available power of a single element, when only that element is excited. We relate this element efficiency to the output noise power generated by a quasi-optical grid amplifier array. Both electromagnetic and thermodynamic derivations are presented. These ideas are used to predict the total noise power and noise radiation pattern of grid arrays. The results are also extended to show that the output noise temperature of the entire array will be the same as the output noise temperature of a single element.

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