Subharmonic Wireless Locking of THz transmitter (Ramot)

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A novel method for wireless sub-harmonic locking a radiating free-running VCO single source or phased-array at THz frequencies

Need and Advantages

Although many significant challenges remain, results suggest that CMOS THz ICs are inevitability. Still, the lack of efficient, high-power (watt-level) sources remains the most conspicuous impediment to further progress. Promising applications for terahertz technology include non-ionizing imaging for medical diagnostics, security screening, and for non-destructive testing and evaluation in manufacturing, spectroscopy, extreme wideband (XWB) communications and radar.

We present powerful transmitters at THz frequencies, with extremely low DC consumption, and compatibility with CMOS technology, for integration with digital and analog utilities. This goal is achieved using the aforementioned technique of wireless sub-harmonic locking, which alleviates the need for Phased-Locked Loops (PLL). Its advantages over methods are its facile (peripheral) instrumentation, extremely low DC consumption, low circuit complexity (relevant for design issues), lack for need in a PLL and its capability to manipulate and control multiple radiating sources (namely, an array). Moreover, this technique allows beam steering of a radiating array (manifesting a phased array), without the need for costly phase-shifters and/or other means.

Potential Applications

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Stage of Development

First prototype ready – 4 antennae array transmitter at 340 GHz, with a locked signal and beam steering capability.

Patents

US Provisional patent

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