Abstracts

High Effective Subharmonic Injection Locking of a Millimeter-Wave IMPATT Oscillator

R. Hayashi and Y. Asano. "High Effective Subharmonic Injection Locking of a Millimeter-Wave IMPATT Oscillator." 1979 Transactions on Microwave Theory and Techniques 27.5 (May 1979 [T-MTT] (Special Issue on Solid-State Microwave/Millimeter-Wave Power Generation, Amplification, and Control)): 500-504.

Abstract-Effective stabilization of an IMPATT oscillator in the millimeter-wave region can be achieved through subharmonic injection locking to a weak parasitic oscillating signal. In subharmonic injection-Iocking experiments more than 19 dB of locking gain at 10-MHz locking range was obtained at a subharmonic ratio 1:2 of the main oscillating frequency. At the subharmonics 1:4 and 1:6, the locking gain was more than 12 and 13 dB at 10 MHz, respectively. Using the parasitic oscillating signal, higher than 32-dB gain and 10-MHz locking range at a subharmonic ratio 1:2 of the parasitic oscillating frequency was obtained. This locking gain was 13 dB higher than that for the main oscillating signal. At the subharmonic ratio 1:4, the gain was more than 15 dB higher. As measured with the spectrum analyzer, the oscillating signal which was locked by the subharmonic injection signal almost coincided with the injection signal. These data show that the subharmonic injection locking has high gain as compared with that using the main oscillating signal.

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