Abstracts

Microwave Frequency Translator

J.S. Jaffe and R.C. Mackey. "Microwave Frequency Translator." 1965 Transactions on Microwave Theory and Techniques 13.3 (May 1965 [T-MTT]): 371-378.

A stepped phase-shift approach, employing semiconductor switching techniques in waveguide, is used to achieve frequency translation at microwave frequencies. Stepped phase shift is employed to approximate a continuous or ideal sawtooth phase shift. It has been shown by Fourier analysis that three is the minimum number of phase steps required to achieve frequency translation with suppression of the carrier and first symmetrical sideband. A tunable device using microwave switching diodes in a single port Y junction is described. The diodes progressively switch three lenths of waveguide into the circuit establishing three phase steps. A ferrite circulator is used to create a two port device and a modulator supplies proper diode biases and switching logic. Carrier suppression of greater than 30 dB and first symmetrical sideband suppression of greater than 20 dB was observed; other sideband amplitudes are predictable. A conversion efficiency of -6 dB including the circulator loss was measured and the bandwidth for 20 dB carrier suppression varies from almost one per cent to three per cent, depending on other suppression criteria.

❑ Return to main document.