Abstracts

A 60-GHz optoelectronic mixing scheme of high image and carrier rejection ratios with an integrated optical single-sideband modulator employed

Y. Ozeki, K. Higuma, S. Oikawa, M. Kishi and M. Tsuchiya. "A 60-GHz optoelectronic mixing scheme of high image and carrier rejection ratios with an integrated optical single-sideband modulator employed." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1986-1991.

We report on the first implementation and performance investigation of a 60-GHz-band optoelectronic image rejection mixing scheme based on a broad-band integrated optical single-sideband modulator. We have confirmed a few advantageous features over electrical image rejection mixers, arising from its nature of being free from electrical phase control of millimeter-wave signals. We obtained at the IF frequency of 800 MHz rejection ratios of >40 dB for the image signal and of >20 dB for the local oscillator (LO) signal in the LO frequency range of 55-65 GHz. The LO bandwidth can be extended further. The IF bandwidth with an image rejection ratio of >20 dB was also confirmed to be as broad as 550 MHz, which is limited not by the configuration but by the bandwidth of the 90/spl deg/ hybrid used in this experiment. Furthermore, fiber-optic transmission of a 155.52-Mb/s-DPSK 59.8-GHz optical millimeter-wave signal was successfully demonstrated for a 20-km standard single-mode fiber. A bit error rate of <10/sup -9/ was achieved at the received optical power of -18 dBm with a negligible dispersion penalty.

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