Abstracts

Ultrawide-band/high-frequency photodetectors

K. Kato. "Ultrawide-band/high-frequency photodetectors." 1999 Transactions on Microwave Theory and Techniques 47.7 (Jul. 1999, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1265-1281.

The two main trends in the progress of ultrawide-band/high-frequency photodetectors (PD's), improving the bandwidth-efficiency product and obtaining a high saturation current, are reviewed. With respect to achieving large bandwidth-efficiency, the limiting factors and potentials of edge-coupled (waveguide, waveguide-fed, traveling-wave, periodic-traveling-wave), resonant-cavity, and refracting-facet photodiodes, as well as the avalanche photodiode are discussed. Regarding high-saturation current, the author estimated how much the space-charge effect limits the saturation current and two ways to reduce the space-charge effect are outlined. One way is to distribute the photocarriers along the edge-coupled PD's and the other is to increase the carrier velocity using a uni-traveling carrier structure. The waveguide-photodiode-based technologies that we have developed are also presented; namely the design and fabrication of a 100-GHz waveguide photodiode (WGPD), uni-traveling carrier WGPD, 60-GHz packaging, and a 20-GHz large-core WGPD for planar lightwave circuit integration. A 50-Gb/s receiver opto-electronic integrated circuit technology based on the WGPD is also presented.

❑ Return to main document.