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Title:A terahertz broadband 3dB directional coupler based on bridged PPDW

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Abstract:In this paper, a novel broadband 3dB directional coupler with very flat coupling based on bridged parallel plate dielectric waveguide (PPDW) is proposed and demonstrated. In the uniform coupling section, a bridge structure between the two PPDWs is employed to obtain accurate coupling value and achieve a broadband coupling. It is found that this new type of coupling structure exhibits excellent performance at terahertz frequencies. In order to achieve strong isolation between the adjacent ports and reduce the power reflection in all ports, two quarter-circle bend arms are introduced as the curved transition sections to connect the uniform coupling section. For this bridged coupler, it only needs the value of the uniform coupling length as short as 400um to achieve a broadband 3dB coupling. In this case, the coupler's average return loss is greater than 28dB, average isolation is better than 27dB and average coupler loss is only 0.9dB, over a percentage bandwidth of 12.5% at 1THz. Compared to the conventional PPDW coupler, the bridged PPDW coupler shows significantly greater bandwidth (about 4.2 times), compact and mechanically stable with a much shorter uniform coupling length (reduced about 61%), which may have potential applications for terahertz integrated circuits and systems.

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