449.Accession number:13034206
Title:Finger capacitance of a terahertz photomixer in low-temperature-grown GaAs using the finite element method
Authors:Chen Long-Chao (1); Fan Wen-Hui (1)
Author affiliation:(1) State Key Lab. of Transient Opt. & Photonics, Xi'an Inst. of Opt. & Precision Mech., Xian, China
Source title:Chinese Physics B
Abbreviated source title:Chin. Phys. B (UK)
Volume:21
Issue:10
Publication date:Oct. 2012
Pages:104101 (7 pp.)
Language:English
ISSN:1674-1056
Document type:Journal article (JA)
Publisher:IOP Publishing Ltd.
Country of publication:UK
Material Identity Number:GB54-2012-011
Abstract:Interdigitated finger capacitance of a continuous-wave terahertz photomixer is calculated using the finite element method. For the frequently used electrode width (0.2 μm) and gap width (1.8 μm), the finger capacitance increases quasi-quadratically with the number of electrodes increasing. The quasi-quadratic dependence can be explained by a sequence of lumped capacitors connected in parallel. For a photomixer composed of 10 electrodes and 9 photoconductive gaps, the finger capacitance increases as the gap width increases at a small electrode width, and follows the reverse trend at a large electrode width. For a constant electrode width, the finger capacitance first decreases and then slightly increases as the gap broadens until the smallest finger capacitance is formed. We also investigate the finger capacitances at different electrode and gap configurations with the 8 μm × 8 μm photomixer commonly used in previous studies. These calculations lead to a better understanding of the finger capacitance affected by the finger parameters, and should lead to terahertz photomixer optimization.
Number of references:19
Inspec controlled terms:electrodes - finite element analysis - gallium arsenide - III-V semiconductors - photoconducting devices
Uncontrolled terms:finite element method - interdigitated finger capacitance - continuous-wave terahertz photomixer - lumped capacitors - photoconductive gaps - finger capacitances - terahertz photomixer optimization - size 0.2 mum - size 1.8 mum - size 8 mum - GaAs
Inspec classification codes:B4250 Photoelectric devices - B0290T Finite element analysis
Numerical data indexing:size 2.0E-07 m;size 1.8E-06 m;size 8.0E-06 m
Chemical indexing:GaAs/bin As/bin Ga/bin
Treatment:Practical (PRA); Theoretical or Mathematical (THR)
Discipline:Electrical/Electronic engineering (B)
DOI:10.1088/1674-1056/21/10/104101
Database:Inspec
IPC Code:H01L27/14; H01L31/00