

168

Accession number:20114614511126

Title:Planar circulator for sub-terahertz-wave reflection-geometry imaging

Authors:Ito, Hiroshi (1); Yamamoto, Hiroshi (1); Muramoto, Yoshifumi (3); Ishibashi, Tadao (4)

Author affiliation:(1) Center for Natural Sciences, Kitasato University, Sagamihara 252-0373, Japan; (2) Graduate School of Medical Sciences, Kitasato University, Sagamihara 252-0373, Japan; (3) NTT Photonics Laboratories, NTT Corporation, Atsugi, Kanagawa 243-0198, Japan; (4) NTT Electronics Corporation, Atsugi, Kanagawa 243-0198, Japan

Corresponding author:Ito, H.(h.ito@kitasato-u.ac.jp)

Source title:Japanese Journal of Applied Physics

Abbreviated source title:Jpn. J. Appl. Phys.

Volume:50

Issue:11 PART 1

Issue date:November 2011

Publication year:2011

Language:English

ISSN:00214922

E-ISSN:13474065

Document type:Journal article (JA)

Publisher:Japan Society of Applied Physics, 1-12-3 Kudan-Kita, Chiyoda-ku, Tokyo, 102, Japan

Abstract:A planar circulator circuit (PCC) implementing a  $180^\circ$  hybrid circuit for reflection-geometry sub-terahertz-wave imaging has been developed. The PCC is evaluated by measuring its signal transfer characteristics at around 300 GHz. A resonant behavior with a unidirectional cycling transmittance is observed in the PCC at around 270 GHz, indicating the proper function of the PCC as a circulator. The peak signal-to-background ratio is measured to be about 10. The PCC is integrated with a uni-traveling-carrier photodiode and a Schottky barrier diode to construct a photonic transceiver module. The characteristics of the PCC in the module are also evaluated by measuring images of a test sample. Although the image resolution decreases with signal frequency deviation from the resonant condition, it is confirmed that a practical contrast can be obtained for a bandwidth of about 40 GHz. Using the fabricated transceiver, the in vivo imaging of a human finger at 270 GHz is successfully demonstrated.

Number of references:30