347
Accession number:20125015781981
Title:Amplifier based broadband pixel for sub-millimeter wave imaging
Authors:Sarkozy, Stephen (1); Drewes, Jonathan (2); Leong, Kevin M. K. H. (1); Lai, Richard (1); Mei, X. B. Gerry (1); Yoshida, Wayne (1); Lange, Michael D. (1); Lee, Jane (1); Deal, William R. (1)
Author affiliation:(1) Northrop Grumman Aerospace Systems, One Space Park, Redondo Beach, CA, United States; (2) Microsemi Corporation, 1064 Greenwood Boulevard, Suite 124, Lake Mary, FL, United States
Corresponding author:Sarkozy, S.(stephen.sarkozy@ngc.com)
Source title:Optical Engineering
Abbreviated source title:Opt Eng
Volume:51
Issue:9
Issue date:September 2012
Publication year:2012
Article number:091602
Language:English
ISSN:00913286
E-ISSN:15602303
CODEN:OPEGAR
Document type:Journal article (JA)
Publisher:SPIE, P.O. Box 10, Bellingham, WA 98227-0010, United States
Abstract:Broadband sub-millimeter wave technology has received significant attention for potential applications in security, medical, and military imaging. Despite theoretical advantages of reduced size, weight, and power compared to current millimeter wave systems, sub-millimeter wave systems have been hampered by a fundamental lack of amplification with sufficient gain and noise figure properties. We report a broadband pixel operating from 300 to 340 GHz, biased off a single 2 V power supply. Over this frequency range, the amplifiers provide > 40 dB gain and < 8 dB noise figure, representing the current state-of-art performance capabilities. This pixel is enabled by revolutionary enhancements to indium phosphide (InP) high electron mobility transistor technology, based on a sub-50 nm gate and indium arsenide composite channel with a projected maximum oscillation frequency f<inf>max</inf> > 1.0 THz. The first sub-millimeter wave-based images using active amplification are demonstrated as part of the Joint Improvised Explosive Device Defeat Organization Longe Range Personnel Imager Program. This development and demonstration may bring to life future sub-millimeter-wave and THz applications such as solutions to brownout problems, ultra-high bandwidth satellite communication cross-links, and future planetary exploration missions. © 2012 Society of Photo-Optical Instrumentation Engineers (SPIE).
Number of references:15
Main heading:Millimeter waves
Controlled terms:Amplification - Broadband amplifiers - High electron mobility transistors - Imaging techniques - Indium arsenide - Indium phosphide - Interplanetary spacecraft - Low noise amplifiers - Medical imaging - Military applications - Monolithic integrated circuits - Noise

figure - Pixels - Radiometers - Satellite communication systems

Uncontrolled terms:Composite channel - Frequency ranges - Improvised explosive devices - InP - Maximum oscillation frequency - Millimeter-wave systems - Monolithically integrated - Planetary-exploration missions - Potential applications - Power supply - Reduced size - Satellite communications - State-of-art performance - Sub-50 nm - Submillimeters - Tera Hertz - Ultra-high bandwidth - Wave imaging - Wave system

Classification code:944.7 Radiation Measuring Instruments - 717 Optical Communication - 718 Telephone Systems and Related Technologies; Line Communications - 723.5 Computer Applications - 741 Light, Optics and Optical Devices - 746 Imaging Techniques - 804.2 Inorganic Compounds - 716 Telecommunication; Radar, Radio and Television - 713.1 Amplifiers - 713 Electronic Circuits - 711 Electromagnetic Waves - 655.1 Spacecraft, General - 404.1 Military Engineering - 714.2 Semiconductor Devices and Integrated Circuits

DOI:10.1117/1.OE.51.9.091602

Database:Compendex