

Thermal imaging

Uncooled long-wave infrared detector

**17 μm uncooled infrared focal plane arrays (IRFPAs)
with a resolution of 320 x 240 pixel (QVGA)**

Fraunhofer IMS presents a new generation of uncooled infrared focal plane arrays (IRFPA) with a pixel pitch of 17 μm and a resolution of 320 x 240 pixel (QVGA). The detector allows the measurement of the emitted radiation of warm bodies in the long-wave infrared band (8 μm – 14 μm) for thermal imaging applications. Examples for applications of IRFPAs are thermography, pedestrian detection for automotive (night vision), firefighting, or surveillance and security.

The IRFPA based on uncooled microbolometer with a pixel pitch of 17 μm and is realized with a QVGA resolution. The IRFPA is designed for a high sensitivity with a noise equivalent temperature difference NETD of < 60 mK at a frame frequency of 30 Hz. A novel readout architecture which utilizes massively parallel on-chip Sigma-Delta- ADCs located under the microbolometer array results in a high performance digital readout. In addition to several thousand Sigma-Delta-ADCs the readout circuit consists of a configurable sequencer for controlling the readout clocking signals and a sensor for measuring the temperature of the IRFPA.

IRFPA

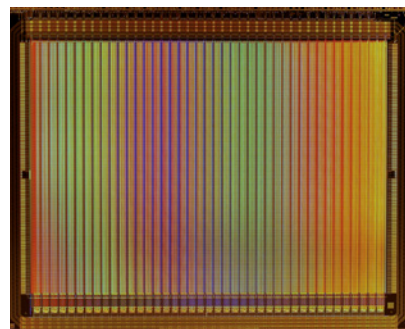
The microbolometers are located in a vacuum package to achieve a higher sensitivity due to thermal isolation. Since packaging is a significant part of the IRFPA's price Fraunhofer IMS uses a chip-scaled package (CSP) to reduce the production costs. The CSP consists of an IR-transparent window with double-sided antireflection coating and a soldering frame for maintaining the vacuum.

The IRFPAs are completely fabricated at Fraunhofer IMS on 200 mm CMOS wafers with an additional surface micromachining process.

SEM Image of a Microbolometer



IR Image



Bolometer Readout IC

Parameters of Fraunhofer QVGA-IRFPA

Parameter	Value
Image format	320 x 240
Pixel pitch	17 μm
Frame frequency	30 Hz
Output Signal	16 bit (digital)
Temperature range	-40 °C – +70 °C
NETD	< 60 mK

Customer benefits

- **High sensitivity:** With a NETD of < 60 mK, the IRFPA enables precise measurements of the emitted radiation, resulting in better image quality in thermographic applications
- **Cost efficiency:** By using a chip-scaled package (CSP), production costs are reduced, which has a positive impact on the final price for the customer
- **Wide range of applications:** The IRFPA is suitable for various applications such as thermography, automotive pedestrian detection (night vision), firefighting and security monitoring, which expands its potential uses

Contact and further information

Business Unit Space and Security
sales@ims.fraunhofer.de

Fraunhofer Institute for Microelectronic
Circuits and Systems IMS
Finkenstraße 61
47057 Duisburg
www.ims.fraunhofer.de/en

