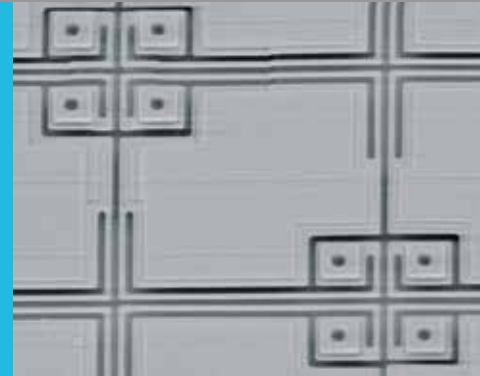
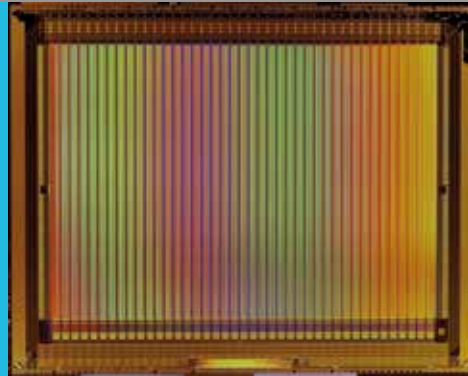




Fraunhofer IMS

FRAUNHOFER INSTITUTE FOR MICROELECTRONIC CIRCUITS AND SYSTEMS IMS



- 1 IR Image.
- 2 Bolometer Readout IC.
- 3 SEM Image of a Microbolometer.

NEW UNCOOLED LONG-WAVE INFRARED DETECTOR

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Fraunhofer IMS presents a new generation of uncooled infrared focal plane arrays (IRFPA) with a pixel pitch of $17 \mu\text{m}$ and a resolution of 320×240 pixel (QVGA). The detector allows the measurement of the emitted radiation of warm bodies in the long-wave infrared band ($8 \mu\text{m} - 14 \mu\text{m}$) for thermal imaging applications.

Examples for applications of IRFPAs are thermography, pedestrian detection for automotive (night vision), firefighting, and security.

IRFPA

The IRFPA based on uncooled microbolometer with a pixel pitch of $17 \mu\text{m}$ and is realized with a QVGA resolution of 320×240 pixel. The IRFPA is designed for a high sensitivity (noise equivalent temperature difference NETD) of $\text{NETD} < 80 \text{ mK}$ 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 temperature sensor for measuring the temperature of the IRFPA.

Parameters of Fraunhofer QVGA-IRFPA

Parameter	Value
Image format	320×240
Pixel pitch	$17 \mu\text{m}$
Frame frequency	30 Hz
Output Signal	16 bit (digital)
Temperature range	$-40 \text{ }^\circ\text{C} - +70 \text{ }^\circ\text{C}$
NETD	$< 80 \text{ mK}$

The microbolometers are located in a vacuum package to achieve a higher sensitivity due to thermal isolation. Since packaging is a significant part of IRFPA's price Fraunhofer-IMS uses a chip-scaled package consisting of an IR-transparent window with double-sided antireflection coating and a soldering frame for maintaining the vacuum resulting in reduced production costs. The IRFPAs are completely fabricated at Fraunhofer-IMS on 8" CMOS wafers.

