

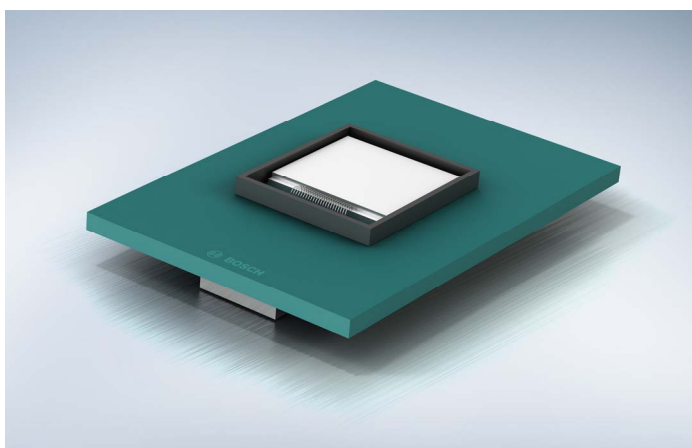
Automotive Electronics

Infrared focal plane array for thermal imaging

SMO130



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Infrared focal plane array SMO130

Customer benefit / features:

- ▶ Uncooled infrared sensor array based on suspended monocrystalline Si thermo diodes
- ▶ Monolithical integration of infrared sensor pixel and read out integrated circuit (ROIC)
- ▶ 82 x 62 pixels
- ▶ 100 μm pixel pitch
- ▶ NETD: 200 mK @ f/1.0 (300 K, 9 Hz)
- ▶ Recommended frame rate 9 Hz (thermal time constant)
- ▶ Analog video output
- ▶ Very cost-efficient sensor concept due to high-volume MEMS process and wafer-level vacuum packaging
- ▶ High volume production capability

Overview

The SMO130 is a small uncooled infrared sensor array designed for applications like entry-level thermography cameras, surveillance cameras, monitoring systems for energy efficient building control or people counting systems.

The sensor consists of a micro-machined sensor element and signal conditioning ASIC in monolithical integration. It is wafer-level packaged and mounted on a single printed circuit board (PCB) with a SMD connector.

Product description

The sensor is based on suspended monocrystalline silicon thermo diodes with infrared absorbing layers realized out of standard semiconductor materials. It is sensitive to thermal radiation between wavelengths of 3 μm up to 14 μm . Optical filters are optionally available, e.g. for the range between 8-14 μm .

The SMO130 features a pixel count of 82 x 62 pixels with a geometrical pitch of 100 μm . The thermal resolution (NETD, noise equivalent temperature difference) of the infrared sensor array is 200 mK @ f/1.0 (300 K, 9 Hz). Better values were shown, depending on the optical system. For thermal imaging of objects the sensor is designed for a surface temperature range of -20 °C up to 250 °C. The maximum frame rate is limited to 9 Hz by an inherent physical design.

The SMO130 accepts a power supply of 5 V and can be operated in a temperature range between -20 °C to +65 °C.

The sensor is RoHS compliant.

Preliminary specification**General technical data**

Spectral response	LWIR & MWIR
Optical filter	optional, e.g. for 8-14 μm
Pixel count	82 x 62 pixels full format
Pixel pitch	100 μm
NETD	200 mK [f/1.0, 300 K, 9 Hz]
Output signal	analog, dynamic range: 0.5 V...4.5 V
Nominal frame rate	9 Hz
Object temperature range	-20 °C... 250 °C
Array operability	$\geq 99.5 \%$

Operating conditions

Supply voltage	5 V
Power consumption	$\leq 30 \text{ mW}$
Operating temperature	-20 °C...+65 °C
Storage temperature	-30 °C...+80 °C

Interface

The SMO130 output signal is analog.

Package

The infrared sensor array is mounted on a 38 x 25 mm² PCB-board with a standard SMD connector and a mechanical protection frame. Details are available on request.

Working principle

The sensor element is designed for the measurement of infrared thermal radiation mainly in the range of 8-14 μm . Its sensitivity in the range between 3 μm to 8 μm allows alternatively the use for gas depending measurements. The single pixel consists out of four monocrystalline silicon thermo diodes in series and an infrared absorber layer. Incoming thermal radiation heats the pixel and the diodes. The integrated read-out circuit detects a shift of the pn-junction voltage and amplifies the signal. The corresponding analog output signal is between 0.5 V and 4.5 V. The pixels are designed for an inherent thermal time constant of around 110 ms.

Portfolio

The SMO130 sensor is part of a broad sensor portfolio, which consists of acceleration sensors, angular rate sensors, combined inertial sensors, pressure sensors, and media sensors. Related applications range from occupant safety systems, vehicle dynamics control, motor management, transmission control systems, A/C systems and navigation.

Bosch has been at the forefront of micro-electro-mechanical systems (MEMS) technology since it first emerged in the 1980s. Today, Bosch is the world's leading supplier for MEMS sensors and holds more than 1,000 patents and patent applications related to the MEMS technology. More than 1 billion sensors are shipped each year from its state-of-the-art wafer fab in Reutlingen – or around 4 million each day. Bosch provides sensors for a wide range of uses in the automotive and consumer electronics.

For more information about automotive MEMS sensors, visit www.bosch-sensors.com.

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