Medical & Digital Health

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ams OSRAM

Medical & Digital Health

ams OSRAM delivers advanced, miniaturized solutions that enable healthcare to be accurate, remote, affordable and individual.

People are paying attention to their personal health and fitness – a trend accelerated by the pandemic. Digitalization and diagnostics at the point of care are the key drivers for professional and personal healthcare, revealing unprecedented functionalities.

ams OSRAM engineering experts create the key technologies for our customers' advanced solutions. We deliver affordable, miniaturized solutions with reliable performance for precise and quantifiable outcomes. Co-creating with our customers, we provide the basis for accessible, accurate and efficient diagnostic and smart healthcare systems. Our product portfolio of advanced light emitters and detectors cover professional and industrial medical uses as well as individual and mobile applications.

Take care: smarter, proactive personal health

Healthcare is becoming accessible for everyone as an integrated element of smartphones and wearables. Digitalization helps to individualize and optimize fitness levels and disease monitoring, freeing medical staff resources while offering individual users faster feedback and more control over their health. Devices are getting smaller, smarter, and ever more accurate.

ams OSRAM brings together innovative light-emitting and optical sensor solutions for the advanced fitness tracking and health monitoring applications of our customers. The variety of available devices and applied technologies have several things in common, namely the need for accurate and reliable data, optimum quality, increasingly miniaturized components, and better energy efficiency.

Partnering with our customers, our engineering experts create the medical solutions of tomorrow to make life better for everyone.

Go mobile, go cloud: rapid and reliable testing

Constantly driving technology forward, ams OSRAM has developed an optical module for Lateral Flow Testing (LFT) – a digitalized solution for virus detection. In a pandemic situation, an easy and convenient testing device leads to increased test reliability and greater user acceptance. The small form factor, extreme reliability, and excellent cost effectiveness of our innovative LFT optical readout are based on the latest achievements in spectral-sensing technology development.

This technology is ideal for rapid, cloud-based readout solutions, easing the load on medical staff and making results more precise, objective, and easier to process within integrated diagnostic systems.

Have a look: medical imaging

Our leading imaging sensing solutions cover the entire spectrum from infrared and visible light all the way to X-rays, offering outstanding precision, high acquisition speeds, low noise, and ultra-low power consumption. Especially for X-rays our sensors allow for lowest and shortest possible exposure to harmful radiation.

A miniaturized form factor with optimum performance is needed for less invasive diagnostics. The pioneering ams OSRAM NanEye comprises the smallest camera module available with fully digital output, offering broader applications for medical endoscopes.

Optimum image quality from the latest diagnostic scanning technologies relies on outstanding precision, high acquisition speed, low noise and ultra-low power consumption. Our advanced product portfolio of CMOS-based sensors and interfaces covers the entire spectrum from infrared and visible light all the way to X-rays.

With our photon-counting solutions, ams OSRAM is pioneering the next level of X-ray technology. We are creating new and better diagnostic possibilities by enabling sharper images while exposing patients to even lower doses of radiation.

Vital Sign Smart Watch

Wireless Wristband Reference Design
AS7050, SFH7015, SFH2703, SFH2713, CT DELSS1.12

General Description

The wristband demo is a mobile device for the continuous measurement of PPG (photoplethysmography) and ECG (electrocardiogram) signals. Both signals are recorded at the periphery (wrist) and are used to calculate heart rate and blood oxygenation (SpO2). As part of our evaluation kit the wristband demo also supports customer engagements and algorithm developments.

An accompanying mobile app serves the communication with the device, its configuration, the display of the raw PPG and ECG signals and calculated values of HRM, HRV and SpO2, the user administration, the measurement accompaniment as well as the data storage.

Inside of the wristband demo, the AS7050 Biosignal Sensor Analog Frontend combined with several inhouse PD and LED products is implemented. The embedded ECG analog front end satisfies IEC 60601-2-47 requirements.

Algorithms converting the synchronized PPG and ECG readings into digital HRM, HRV, SpO2 and in future Blood Pressure values support the AS7050.

Target Market / Applications

- Fitness bands
- Smart watches
- Heart-rate monitors
- Cuff-less blood pressure monitor devices
- ECG monitoring
- Hearables
- Optical sensor platforms

Key Features

- Two independent signal acquisition paths
- Up to eight LED outputs and up to 6 PD inputs
- Additional ECG and GPIO inputs
- Automatic LED current and PD offset control
- Low power consumption
- High relustion with short conversion time
- High dynamic range
- Small form factor chip scale package

Benefit / Value

- Support of PPG+ECG or PPG+PPG signal acquisition
- Full automatic signal balancing
- Highly flexible in terms of optical LED/PD arrangements
- Medical grade ECG
- Enables super fast signal acquisition
- Improved signal quality

Learn more: Vital Sign Monitoring

Vital Sign Accessory: CareLife

AS7050 – Biosignal Sensor accessory reference design

General Description

The CareLife demo is a mobile device for the continuous, cuff-less estimation of heart rate, heart rate variability and SpO2 (blood oxygen saturation) which is determined from PPG (photoplethysmography) and ECG (electrocardiogram) signals. Both signals are recorded at the periphery (preferably thumb and index or middle finger) and are used to calculate heart rate, pulse wave velocity and blood oxygenation. Various HRV parameters are also to be captured based on the ECG signal.

An accompanying mobile app serves the communication with the device, its configuration, the display of the raw PPG and ECG signals and calculated values of HRM, HRV and SpO2, the user administration, the measurement accompaniment as well as the data storage.

Inside of the CareLife demo the AS7050 Biosignal Sensor Analog Frontend is implemented. The operation is based on photoplethysmography (PPG) and electrocardiogram (ECG). PPG is the most used HRM method, which measures the pulse rate by sampling light modulated by the blood vessels, which expand and contract as blood pulses through them. ECG is the reference for any measurement of the bio potential generated by the heart.

The embedded ECG analog front end satisfies IEC 60601-2-47 requirements. Algorithms converting the synchronized PPG and ECG readings into digital HRM, HRV, SpO2 and in future Blood Pressure values support the AS7050. The AS7050 is a system in package solution including analog front-end, sequencer as well as application software.

AS7050 has the capability to drive up to eight external LEDs and support up to six additional photodiodes and electrodes. In addition to HRM/HRV and SpO2, the module also enables skin temperature and skin resistivity measurements by providing interfaces to external sensors. Blood pressure estimations will be possible based on the PPG and ECG signal measurements as well.

The AS7050's low-power design and small form factor chip scale package is particularly well suited to application in fitness bands, smart watches, sports watches and smart patches, in which board space is limited and in which users look for extended, multi-day intervals between battery recharges.

Target Market / Applications

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- Heart-rate monitors
- Cuff-less blood pressure monitor devices
- ECG monitoring
- Hearables
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Learn more: AS7050 Biosignal Sensor Analog Frontend

Point-of-Care and At-Home Diagnostics: Digital Rapid-Lab

Reusable lateral flow test reader platform featuring AS7341L

General Description

ams OSRAM's LFSensor PCB technology enables spectral sensing on a lateral flow test.

Lateral flow tests LFTs are compact, portable, and easy to use. Their widespread use is mainly due to their simple design, meaning they can be produced at high volume in a cost-effective way. However, they have their drawbacks: limited sensitivity, signal quantification difficulties, and single-analyte detection. In the recent years, several technologies have tried to overcome some of these drawbacks using a digital readout. Others introduced (benchtop) reader systems, sometimes in combination with other readout methodologies such as fluorescence measurements.

ams OSRAM is innovating in this market by introducing a proprietary, small, and cost-effective reusable LFT reader device. This new device makes use of the company's highly sensitive multi-channel spectral sensors (AS7341L) that for the first time enable highest sensitivity plus quantitative readout of LFT strips in a pocket-sized reader format. The unique cartridge design, along with ams OSRAM sensors and optical design expertise, create an ecosystem that allows you to perform measurements at home with performance levels typically only available with expensive lab equipment. The flexible reader and cartridge design, which operates in a transmission measurement mode, allows for colorimetric as well as fluorescent operation to serve with a single reader and cartridge design a wide variety of applications.

Target Market / Applications

- Fertility
- Iron Deficiency
- Vitamin D
- COVID
- Pregnancy
- CRP
- Cardiac
- Thrombosis
- Veterinary

Key Features

- Lab measurement quality for home use applications
- Highest sensitivity
- Small form factor compared to bench-top readers
- Quantitative data readout enables monitoring of applications
- App tracking
- Cloud connected

Benefit / Value

- Solution for monitoring applications
- Bench-top reader performance
- Ease of use allows on-site testing
- Delivery of results is fast (minutes)
- Simple and cost-effective architecture

Learn more: Point-of-care diagnostics

Digital Temperature Sensor

General Description

The AS6221 is a highly accurate digital temperature sensor with an accuracy of up to ±0.09°C, which is ideal for healthcare applications, wearables, and devices requiring high-performance thermal information.

A complete digital sensor system, the AS6221 requires no calibration or linearization. It provides measurement outputs via a standard I²C interface. The sensor supports eight I²C addresses avoiding bus conflicts in multi-sensor use cases.

The ultra-small size of the sensor (WLCSP 1.5 x 1.0 mm) enables accurate body/skin temperature measurements in extremely small health and lifestyle monitoring products. In addition to the high accuracy and the small form factor, the AS6221 offers an ultra-low power consumption, for example measuring with four samples/s, the current consumption is only 6 µA. The sensor has four different automatic acquisition modes and maintains the high accuracy over the full supply range from 1.71 to 3.6 V.

An integrated alert functionality triggers an interrupt to the micro controller when a temperature threshold is exceeded. The temperature threshold for the alert function can be adjusted in a device register.

Target Market / Applications

- Mobile Health
- Wearables
- Fitness trackers and bands
- Electronic devices
- Laptops
- Tablets
- SSDs
- PTC replacement

Key Features

- High temperature accuracy
- Ultra-low power consumption
- Small integration size (WLCSP)
- Complete sensor system with serial bus connection
- Alert functionality for exact temperature control

Benefit / Value

- Enables highly accurate skin temperature measurements
- Long battery life and low self heating
- Easy-to-use solution, i.e. no calibration or linearization needed
- Minimal board space and fast reaction time

Learn more: Digital Temperature Sensors

NanEye

NanEye Miniature Camera Module for medical/endoscopic applications

General Description

The smallest digital camera module available offering unique solutions for size-critical medical applications like single-use endoscopic devices. It features a digital interface, making it easier to interface and ensure communication and data transfer over longer distances. The NanEye includes an integrated lens and attached 2m cable to be used for assembly in the end application.

Target Market / Applications

- Disposable endoscopy
- Capsule endoscopy

Key Features

- Integrated wafer level multi element high performance optics
- 320 x 320 pixels in 1mm^2
- Digital interface
- Low power consumption
- High sensitivity
- Pre-attached cable

Benefit / Value

- All-in-one module, including lens stack, aperture, front glass and cable
- Ideal for applications with extreme size restrictions
- Reduced distortion
- Affordable for single use
- Easy to integrate
- Digital interface

Learn more: NanEye Miniature Camera Module

Sensor Chip for 32-slice CT

General Description

The AS5951 is a sensor chip for 32-slice CT detectors that combines the photodiodes and the readout circuit on a single CMOS chip. This sensor solution, which includes an array of photodiodes with ultra-low dark current and a 128-channel ADC side-by-side, allows the assembly of the pixel array on three adjacent edges of the device. Two AS5951 ICs can be placed in Z-direction enabling the design of 32-slice detectors for cost optimized CT machines.

The AS5951 has a sensor dimension in Z-direction of 15.615 mm with a pixel dimension of 0.98x0.98 mm² in high resolution mode. In low dose mode two pixels are connected together to a 0.98x1.96 mm², this mode reduces the power consumption, as only half of the ADC channels are active. Pixel dimensions can be customized on request. The sensor can be directly assembled on a substrate using a wire bonding process for manufacturing of a CT module.

Improved low dose performance can be achieved because of superior dark current of max. 1 pA due to the near zero offset voltage across the photodiode. The input-related noise is very low, in high-resolution mode a typ. noise of 0.21 fC can be reached including photodiode for an input current range of 200 nA.

The max. power dissipation of 128 mW per device in high resolution mode and 67.2 mW in low power mode reduces self-heating effects and lowers the overall cost of cooling the system. An internal reference voltage and bias generator reduces the bill of material. Featuring on-chip photodiodes, the AS5951 offers a cost-optimized solution for 32-slice CT detectors.

The digital data readout can be accessed via SPI interface. It is also used to configure parameters such as mode of operation, input current range, selection of reference voltage and enabling the calibration mode. An integrated temperature sensor enables monitoring of the junction temperature. The AS5951 is delivered as die on foil on frame.

Target Market / Applications

- Medical, industrial and security CT detector modules
- 16-slice and 32-slice CT detectors

Key Features

- Monolithic integration of 128-channel ADC and photodiode array in one device
- Automatic zero offset voltage calibration across photodiode for ultra-low dark current
- Integrated reference voltage and bias current generator for low bill of material
- Two modes of operation: High resolution mode and low dose mode
- Customization of pixel dimensions on request

Benefit / Value

- Ultra-low dark current of max. 1pA
- Lowest input related noise of typ. 0.21fC
- Fast integration time down to 200µs
- Low power dissipation of max. 1mW per channel in high resolution mode
- High ADC linearity of ±600ppm including photodiode

Learn more: AS5951 CT Sensor Chip

Readout chips for X-ray flat panels

General Description

The AS585x ICs are 16-bit, 256-channel low-noise charge-to-digital converters designed for use in digital X-ray systems. The high degree of programmability enables system performance optimization in a wide range of applications. The combination of fast speed, low noise and low power consumption maximizes the image quality and minimizes patient dose exposure whilst improving the time to market. Each channel front-end consists of a charge sensitive amplifier (CSA) and a correlated double sampler (CDS), that removes offset and flicker noise from the signal, which is then converted to digital. A fast and reliable LVDS interface transmits the output digital data off-chip. Built-in diagnostic functionalities enable error detection in the signal chain. Voltage references and a temperature sensor are included on the chip.

An SPI interface allows for easy programming of the device parameters. Four different power modes allow the user to minimize the current consumption for the chosen speed. Line times of 20, 28.5, 40 and 80 µs require as little as 3.1, 2.6, 1.6 and 1.1 mW per channel respectively. A special ADC operation mode decreasing the minimum line time to 15 µs without increasing the power consumption is also available.

Additionally, it is possible to add together the charges in pairs of adjacent channels; with this binning, the fastest achievable line time is 10 µs. ams provides the AS585x series readout ICs in two different packaging options (the A- or B-type flex) and can supply other customer-specific flex designs on request.

Target Market / Applications

- Static and dynamic digital X-rays
- Digital radiography
- Mammography
- Fluoroscopy
- Interventional X-ray imaging
- Industrial non-destructive testing

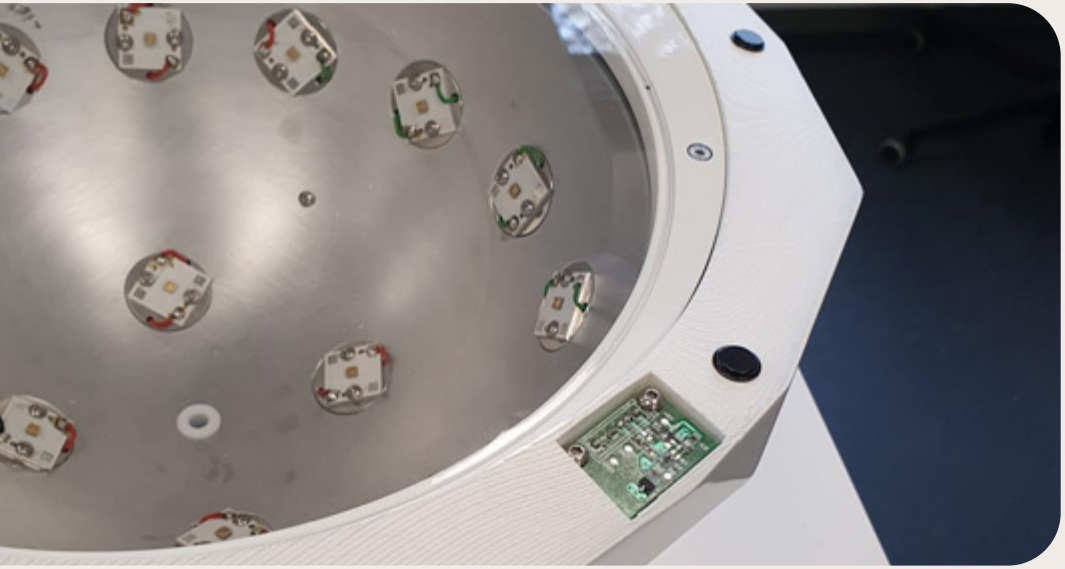
Key Features Features

- 256 channels with 16-bit resolution
- Line times down to 20 µs (or 15 µs in ADC low-OSR mode)
- Binning mode (half number of effective channels) for 2x faster readout speed
- Binning and special 240-channels mode to enable 256, 240, 128 or 120 channels
- Supports detectors with line capacitance up to 200 pF
- Programmable settings: input charge range, holes or electrons polarity, detector timing, low-pass filter time constant and line time
- Up to three different internal charge pump cycles for offset adjusting, signal emulation and switch charge injection compensation
- Four power modes in addition to sleep and full power-down modes
- Correlated double sampling for offset subtraction with programmable time constant
- Built-in self-test features

Benefit / Value

- Flexible programming to optimize for application needs
- Suitable for a wide range of detector sizes
- Best-in-class combination of noise, power consumption and speed
- Ultra-low power for portable applications
- High-speed for dynamic applications
- Low-noise for great image quality
- Accurate temperature feedback
- Chip-on-flex packaging for immediate integration into the detector

Learn more: X-ray sensors



Smart UV Sphere

with OSLON® UV LED and UV Sensor

General Description

The Smart UV Sphere demonstrates the innovative use of UV-C LEDs for UV-C treatment purposes. The combination with the UV sensor allows a closed-loop balancing of the irradiation and dose. Due to radiation monitoring, aging drifts of the LEDs can be compensated automatically by a longer irradiation. This assures an efficient disinfection over the whole lifetime of the device.

Target Market / Applications

- UV-C treatment of mobile devices
- UV-C treatment of surfaces
- UV-C treatment of air and water
- Wound treatment with UV-C
- Household robotics
- Water-, air purifiers
- Adapters on water taps
- Bidets, hand dryers
- And more

Key Features

- Flexible and robust semiconductor technology
- Adjustable radiant flux
- Mercury free
- Optimized spectral composition
- Direct radiation monitoring (automatically)
- Integrated closed-loop balancing

Benefit / Value

- Provide dedicated Radiant flux
- Long lifetime
- High effectiveness against pathogens
- Constant radiant flux control and balancing
- Direct dose detection and monitoring
- Assured disinfection efficiency over the whole device lifetime

LED solutions for smart UV-C sanitization


ams OSRAM
Sensing is life