

# Light is security

## Selection guide and product portfolio for infrared vision applications

### Realize new visions with infrared light

Designers and manufacturers of “invisible” IR-based applications benefit clearly from ams OSRAM’s high-quality infrared components, which enable high system efficiency and low total system costs.

ams OSRAM delivers a comprehensive portfolio of innovative infrared LEDs in every performance class. Our products combine the competence of four decades of expertise in the semiconductor industry with a century of experience in lighting technology from OSRAM GmbH. All opto semiconductor processes are unified under one roof – from chip development, packages and phosphors, to finalized components. Thanks to our extremely reliable products and the energy efficiency inherent in infrared LED technology, the once unimaginable is now today’s reality.



# Applications

Realize new visions with infrared light

ams OSRAM



## Infrared illumination for security applications

ams OSRAM is a leading supplier for many security applications long-established in the industry.

### Security applications for indoor and outdoor

Use cases include public space security solutions, such as public space observation, indoor monitoring systems, smart doorbells, and more.

### Number plate recognition

Identifying the owner of a car by scanning the number plate. This is used on highways and in parking garages, for automated pay systems, and more.

### Traffic control

Traffic monitoring for toll systems on highways and toll roads, but also traffic monitoring at busy intersections, for example for automatic traffic light control, and more.



## Infrared illumination for mobile and wearables

Biometric identification applications are pervading our daily lives. For example, we access apps on our mobile and computing devices secured by fingerprint or 2D face recognition. While this makes our lives more convenient, it increases data security risk. ams OSRAM's infrared LEDs offer the highest reliability and efficiency to ensure precision on the biometric image. They support different methods of biometric identification, like:

- Fingerprint scanning
- 2D facial scanning
- Palm vein scanning
- High-power eye tracking



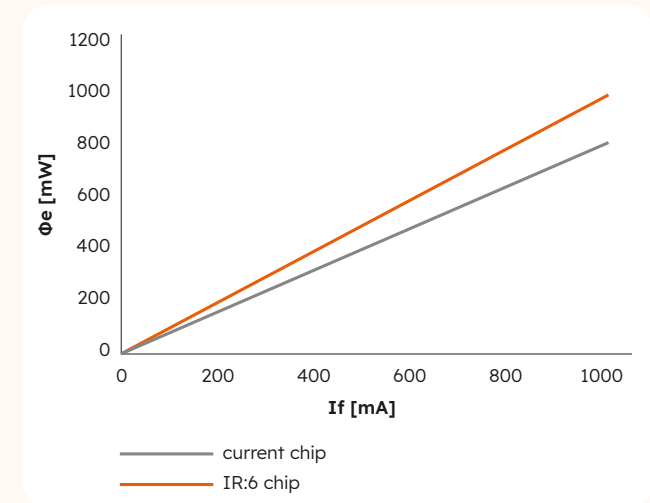
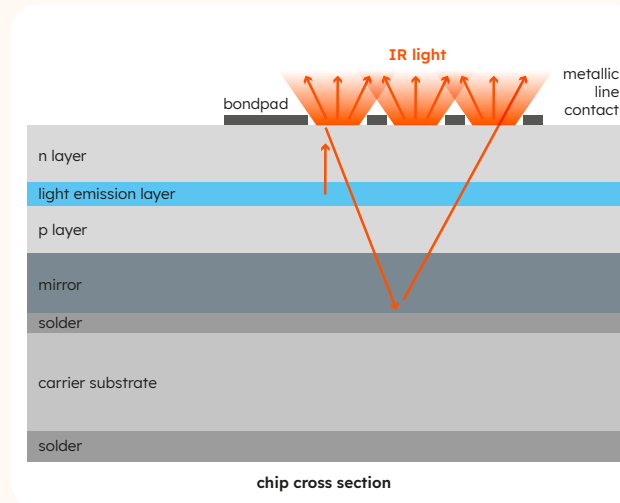
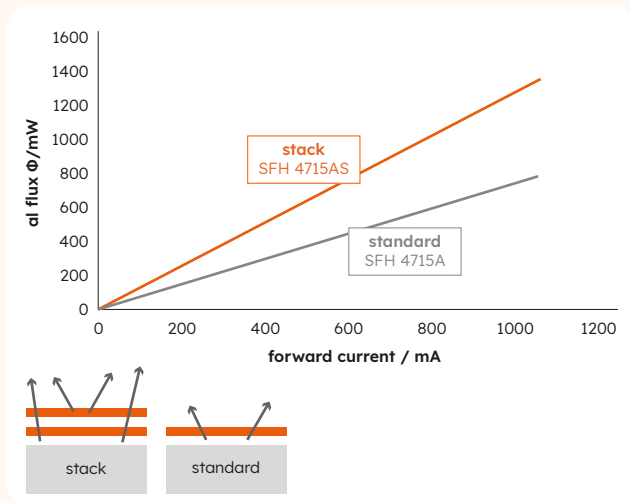
## Industrial applications

Many other applications require infrared illumination. In industry, where automation continues to increase, ever more robots and machines require:

- Machine vision – quality control
- Machine vision – industrial automation
- Time of flight – robotics
- Time of flight – people counting

# Technology

Benefit from decades of technical innovation from an industry leader



## ams OSRAM stack technology

Light source requirements vary for different infrared illumination applications. While shorter distance illumination applications mainly illuminate a smaller area with a smaller field of view, mid-to long distance illumination typically requires a narrower field of view to illuminate a larger area.

Our stack technology places two P/N junctions in series within one chip to achieve an optical output power increase of almost 180%.

Although the operating voltage of stacked LEDs is higher, stacked infrared-emitting LEDs come with several advantages:

- Space saving and lower system cost due to fewer components
- Higher radiant flux and higher output power
- Illumination of a longer distance is possible

## Continuous improvement – thin-film chip inside

Virtually all the infrared-emitting LEDs in our portfolio have several generations of thin-film chips inside. This means their steady increase in performance.

What makes IR thin-film emitters so special in terms of performance?

- Radiation is generated within a film of 10 $\mu$ m thickness
- Improved efficiency due to reduced absorption behavior
- Backwards emitted light is reflected by a metal mirror layer
- Improved extraction of radiation as the angles of internal reflection are randomized by a textured surface
- Radiation is emitted only at the top surface
- Due to these benefits, a thin-film emitter has roughly 300% higher emission compared to a standard volume emitter

## IR:6 technology – material improvements

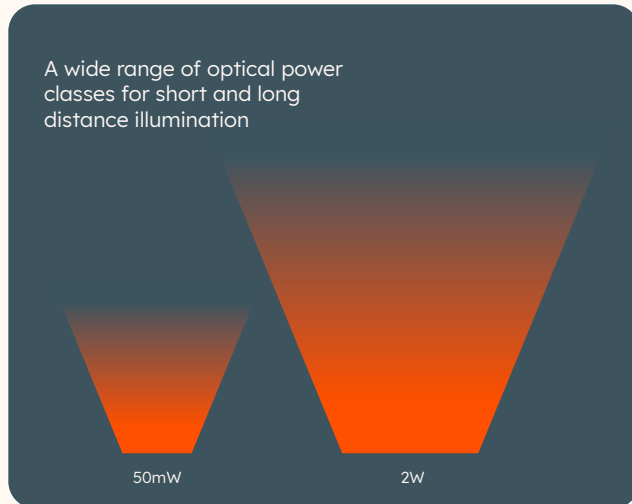
In the latest generation of IR chips from ams OSRAM, the new internal reflector reduces optical losses in the die while increasing radiant intensity. In addition, the improved roughening of the chip's surface (a characteristic of the thin-film technology) optimizes decoupling efficiency, and results in narrower distribution of light output.

Another improvement made in the IR:6 chip is the design of the new n contact (bond pad). The bond pad was more centered on the chip surface, which results in better spread of current across the device, and produces a lower forward voltage.

# The right IR LED for each application requirement

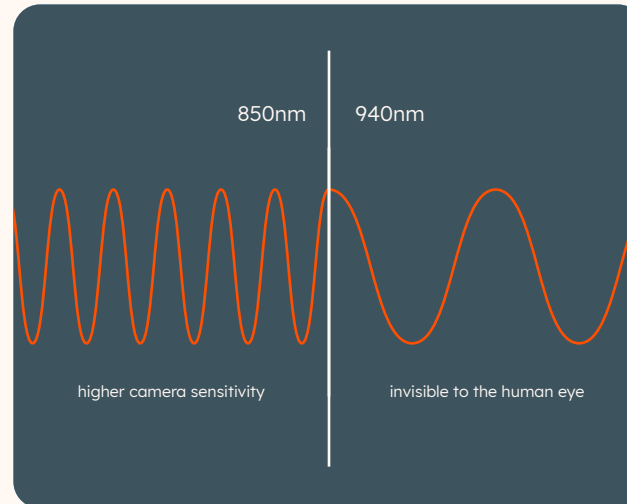


Light source requirements vary for different infrared illumination applications



## System requirements – long range vs. short range

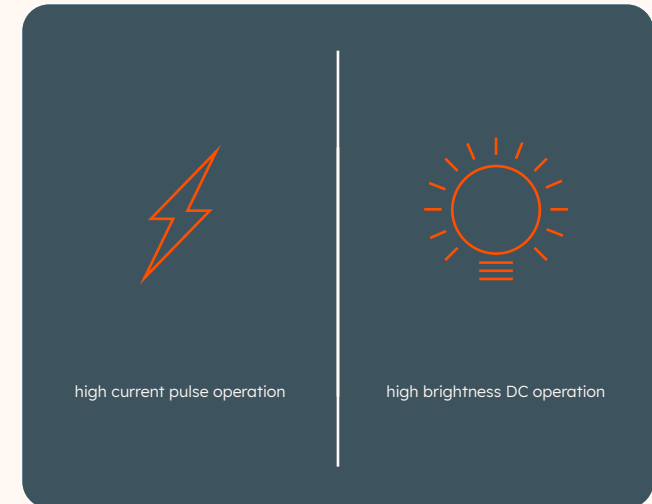
Depending on the distance illuminated, the system requires different output power and fields of view toward the light source. While illuminating a shorter distance, reduced intensity and a wider beam angle are key for a homogenous illumination of the targeted area. High intensity and high-power devices with narrow beam angles are required for long range illumination systems, like traffic monitoring and outdoor security applications. The ams OSRAM portfolio offers a variety of options for output power classes and viewing angles to meet application-specific requirements.



## Wavelength, visibility and camera sensitivity

ams OSRAM offers infrared LEDs in the wavelength spectrum of 850nm, 920nm and 940 nm, each of those having several advantages, but there is a tradeoff between visibility of the emitted light and associated camera sensitivity.

- 850nm is ideal for machine vision or outdoor CCTV applications by offering a high sensitivity for imaging, but even barely visible (with red glow effect) by humans.
- 940nm is good choice for facial recognition or eye-tracking solutions, as while it is virtually invisible to the human eye it has a slight red glow
- 920nm enables a necessary trade-off between sensor sensitivity and red glow.



## Operation mode DC vs. pulsed operation

ams OSRAMs IR LEDs are designed for both DC and pulsed operation. This specifically means that the chips for DC operation can be driven for longer with a stable performance, while chips for pulsed operation can be driven up to an extremely high current and require highest reliability.

IR LEDs with high-current optimized chips, i.e. stack technology chips (with „S“ in the nomenclature) are ideal for applications requiring pulsed operation (e.g. machine vision).

## Continuous operation vs. temporary operation

Light source requirements differ depending on the operating mode. LEDs used in continuous operation need outstanding reliability and long-life properties. Those used in systems that are operated in battery mode, require a high efficiency of the LED and a good thermal resistance of the IR LED ensure a longer use of the battery.

# The IR OSOLON® Black series



Great variety and power options to meet different requirements

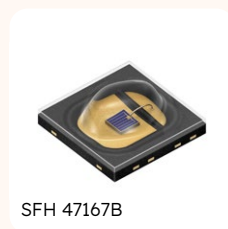
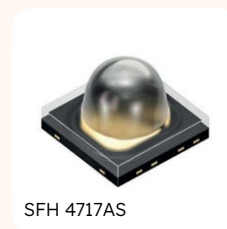
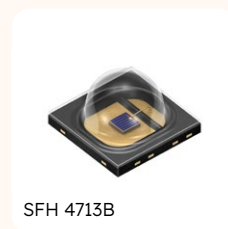
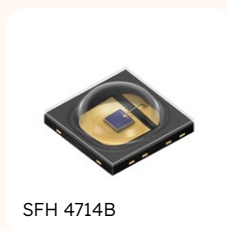
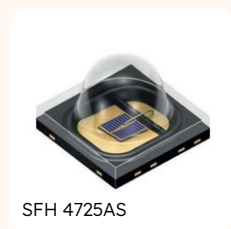
	SFH 4713B <sup>(3)</sup>	SFH 4714B <sup>(3)</sup>	SFH 4718A	SFH 47167B <sup>(3)</sup>	SFH 4715A	SFH 4716A
<b>Active chip area</b>	30mil			40mil		
Centroid Wavelength [nm]	850	850	850	850	850	850
Half angle [°]	40	75	20	H: 135° V: 110°	40	75
Radiant Flux [mW] @1 A	975	940	665	940	860	890
Radiant Intensity [mW/sr] @1 A	505	190	730	235	500	170
Forward Voltage [V] @1 A	1.63	1.63	1.75	1.63	1.7	1.7
Max DC current [mA]	1	1	1	1	2	2
Max pulse current [mA]	1	1	1	1	3	3
Package Dimensions L×W×H [mm]	3.75 × 3.75 × 2.29	3.75 × 3.75 × 1.51	3.75 × 3.75 × 2.66	3.75 × 3.75 × 1.53	3.75 × 3.75 × 2.29	3.75 × 3.75 × 1.51

	SFH 4715AS <sup>(1)(2)</sup>	SFH 4716AS <sup>(1)(2)</sup>	SFH 4717AS <sup>(1)</sup>	SFH 4725AS <sup>(1)(2)</sup>	SFH 4726AS <sup>(1)(2)</sup>	SFH 4727AS <sup>(1)(2)</sup>
<b>Active chip area</b>	40mil					
Centroid Wavelength [nm]	850	850	850	920 / 940	920 / 940	920 / 940
Half angle [°]	40	75	25	40	75	25
Radiant Flux [mW] @1 A	1530	1530	1340	1580	1580	1340
Radiant Intensity [mW/sr] @1 A	900	350	1150	930	360	1150
Forward Voltage [V] @1 A	3.05	3.05	3.05	2.8	2.8	2.8
Max DC current [mA]	1.5	1.5	1.5	1.5	1.5	1.5
Max pulse current [mA]	3	3	3	3	3	3
Package Dimensions L×W×H [mm]	3.75 × 3.75 × 2.29	3.75 × 3.75 × 1.51	3.75 × 3.75 × 2.66	3.75 × 3.75 × 2.29	3.75 × 3.75 × 2.29	3.75 × 3.75 × 2.66

(1) .... Stacked Die version

(2) ... also in automotive qualified variants available

(3) ... IR:6 technology



## General Description

IR OSOLON® Black Series are extremely cost-effective, high-performance infrared emitters with 850 nm for high camera sensitivity and 940 nm for reduced reddish glow for security and interior applications (semi covert), and 920 nm for a compromise between these characteristics. The devices combine exceptionally high total optical flux and small industry standard packages with a footprint of only 3.75 × 3.75 mm<sup>2</sup> for incredibly dense packing.

Further benefits include a highest total radiant flux at 1 A DC, low thermal resistance for operation at elevation ambient temperature and high current DC operation.

## Features and benefits

- High flexibility in application designs due to wide variety of packages and chip options
- Stacked and non-stacked chip options available for different brightness levels
- Three wavelength options: 850 nm for high camera sensitivity, 940 nm for reduced red glow, and 920 nm for a compromise between these strengths and weaknesses
- Different viewing angle options ranging from ±25° up to ±60° enable use in wide range of applications including rectangular view

## Applications

- Infrared illumination
- 2D face recognition
- CCTV cameras – long range and short range
- Home security
- Machine vision
- Number plate recognition

# OSLON® P1616



Top performer with a superior package size to performance ratio

	SFH 4170S <sup>(1)</sup>	SFH 4180BS <sup>(1)(2)</sup>	SFH 4171	SFH 4171S <sup>(1)</sup>	SFH 4181BS <sup>(1)(2)</sup>
Active chip area	unlensed		lensed		
Centroid Wavelength [nm]	850	920 / 940	850	850	920 / 940
Half angle [°]	65	65	33	33	33
Radiant Flux [mW] @1 A	1485	1485	940	1580	1580
Radiant Intensity [mW/sr] @1 A	325	325	480	765	765
Forward Voltage [V] @1 A	3.05	2.8	1.63	3.05	2.8
Max DC current [mA]	1000	1000	1000	1000	1000
Max pulse current [mA]	2000	2000	1000	2000	2000
Package Dimensions L×W×H [mm]	1.6 × 1.6 × 0.82	1.6 × 1.6 × 0.82	1.6 × 1.6 × 1.72	1.6 × 1.6 × 1.72	1.6 × 1.6 × 1.72

	SFH 4182BS <sup>(1)(2)</sup>	SFH 4172	SFH 41847S <sup>(1)</sup>	SFH 41747
Active chip area	flat lens		peanut lens	
Centroid Wavelength [nm]	920 / 940	850	920 / 940	850
Half angle [°]	65	65	V: 70 H: 45	V: 70 H: 45
Radiant Flux [mW] @1 A	1580	800	1150	700
Radiant Intensity [mW/sr] @1 A	455	230	310	190
Forward Voltage [V] @1 A	2.8	1.75	2.95	1.75
Max DC current [mA]	1000	1000	1000	1000
Max pulse current [mA]	2000	1000	1000	1000
Package Dimensions L×W×H [mm]	1.6 × 1.6 × 1.34	1.6 × 1.6 × 1.34	1.6 × 1.6 × 1.38	1.6 × 1.6 × 1.38

(1) .... Stacked Die version

(2) ... IR:6 technology



## General Description

The OSLON® P1616 products are the latest addition to ams OSRAM's (near) infrared high-power LED product portfolio. With a package size of only 1.6 x 1.6 mm<sup>2</sup> and a best-in-class intensity, the devices are the industry's smallest high-power infrared devices addressing various use cases in the consumer and industrial application fields.

## Features and benefits

- Tiny package – only 1.6 × 1.6 mm<sup>2</sup> – enabling use in space-critical applications
- Nanostack technology for higher output – increases output by almost 180%
- Lensed and unlensed options available to meet different application requirements
- Three wavelength options: 850 nm for high camera sensitivity, 940 nm for reduced red glow, and 920 nm for a compromise, between these strengths and weaknesses
- Different viewing angle options ranging from ±25° up to ±60° enable use in wide range of applications including rectangular view

## Applications

- Biometric identification for access control
- User authentication with 2D face recognition, e.g. laptops and smart doorbells
- Infrared Illumination Applications

# SYNIOS® P2720



Combining compact footprint with high power emission

	SFH 4770S <sup>(1)</sup>	SFH 4775S <sup>(1)</sup>
	unlensed	
Centroid Wavelength [nm]	850	920 / 940
Half angle [°]	60	60
Radiant Flux [mW] @1 A	1360	1360
Radiant Intensity [mW/sr] @1 A	420	420
Forward Voltage [V] @1 A	3.05	2.8
Max DC current [mA]	1000	1000
Max pulse current [mA]	3000	3000
Package Dimensions LxWxH [mm]	2.75 x 2 x 0.6	2.75 x 2 x 0.6

(1) .... Stacked Die version

## General Description

ams OSRAM offers extremely compact high-power SYNIOS® IR LED for industry, consumer and automotive applications. The products impress with a particularly low height, which makes them ideal for narrow applications that nevertheless require high efficiency. The products are available without integrated lens, but secondary optics for narrow beam angles are available.

## Features and benefits

- Infrared light source with high efficiency
- Highest optical output due to double stack emitters inside
- Three wavelength options: 850 nm for high camera sensitivity, 940 nm for reduced red glow, and 920 nm for a compromise between these strengths and weaknesses
- Application-specific portfolio to support industrial as well as automotive applications
- Most slim package in the market with a height of only 0.6 mm enables narrow clustering and design in an extremely limited space

## Applications

- Safety and security applications
- 2D facial recognition
- Gesture recognition
- Eye tracking



SFH 4770S

# IR Power TOPLED®



Well-established product family

	SFH 4250	SFH 4250S <sup>(1)</sup>	SFH 4240	SFH 4258	SFH 4258S <sup>(1)</sup>	SFH 4248
	unlensed			lensed		
Centroid Wavelength [nm]	850	850	940	850	850	940
Half angle [°]	60	60	60	15	15	15
Radiant Flux [mW] @1 A	60	100	55	70	115	65
Radiant Intensity [mW/sr] @1 A	20	30	18	110	185	100
Forward Voltage [V] @1 A	1.5	3.1	1.5	1.5	3.1	1.5
Max DC current [mA]	100	100	100	100	100	100
Max pulse current [mA]	1000	700	1000	1000	700	1000
Package Dimensions L×W×H [mm]	2.8 × 3.2 × 1.9	2.8 × 3.2 × 1.9	2.8 × 3.2 × 1.9	2.8 × 3.2 × 3.8	2.8 × 3.2 × 3.8	2.8 × 3.2 × 3.8

	SFH 4259	SFH 4259S <sup>(1)</sup>	SFH 4249
	flat lens		
Centroid Wavelength [nm]	850	850	940
Half angle [°]	25	25	25
Radiant Flux [mW] @1 A	70	115	65
Radiant Intensity [mW/sr] @1 A	55	85	50
Forward Voltage [V] @1 A	1.5	3.1	1.5
Max DC current [mA]	100	100	100
Max pulse current [mA]	1000	700	1000
Package Dimensions L×W×H [mm]	2.8 × 3.2 × 3.5	2.8 × 3.2 × 3.5	2.8 × 3.2 × 3.5

(1) .... Stacked Die version



## General Description

The IR Power TOPLED® is the industry standard footprint set by ams OSRAM. The broad range of different lens options – with +-15° as the narrowest viewing angle in an SMT package in our portfolio up to broad viewing angles – make these devices the ideal choice for a wide range of applications. Additionally, the products are available in 850 nm and 940 nm as well as stacked and non-stacked versions to meet different power requirements.

## Features and benefits

- High flexibility in application designs due to high variety of packages and chip options
- Stacked and non-stacked chip options available for different brightness levels
- Two wavelength options: 850 nm for high camera sensitivity and 940 nm for reduced red glow
- Different viewing angle options ranging from ±15° up to ±60° enable use in wide range of applications

## Applications

- Industrial automation
- Measurement leveling
- Gesture recognition
- Biometric identification for access control ,e.g. fingerprint scanning



# Overview

## Infrared high power LEDs portfolio

		<b>OSLON® Black</b>	<b>OSLON® P1616</b>	<b>SYNIOS® P2720</b>	<b>IR Power TOPLED®</b>
		Great variety and power options to meet different requirements	Top performer with a superior package size to performance ratio	Combining compact footprint with high power emission	Well-established product family
Security Applications	Long Distance CCTV	●			
	Mid to short distance CCTV	●	●	●	
	People Counting	●	●		●
	Smart Door Bell	●	●		
	Home CCTV	●			
	Baby Monitoring		●		●
Mobile and Wearables	Vein / Fingerprint Recognition	●		●	
	2D Facial Recognition	●		●	
	High Power Eye Tracking		●		
	Augmented Reality		●		
Industrial Applications	Robotics		●		●
	Machine Vision	●		●	
	Traffic Control	●			
	Automated Number Plate Recognition	●			



**OSLON® Black**  
[ams-osram.com/products/product-families/oslon-black](https://ams-osram.com/products/product-families/oslon-black)



**OSLON® P1616**  
[ams-osram.com/products/product-families/oslon-p1616](https://ams-osram.com/products/product-families/oslon-p1616)



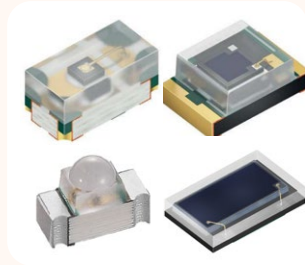
**SYNIOS® P2720**  
[ams-osram.com/products/product-families/synios-p2720](https://ams-osram.com/products/product-families/synios-p2720)



**Power TOPLED®**  
[ams-osram.com/products/product-families/topled](https://ams-osram.com/products/product-families/topled)

# Low Power infrared LEDs and Detectors

Comprehensive portfolio of innovative infrared LEDs in every performance class



## Power TOPLED® Family

Well-established Power TOPLED® infrared emitters with surface mount package with or without lens.

## CHIPLED® Family

Ultra-compact CHIPLED® infrared emitters, photodiodes and phototransistors ideal for cost-sensitive designs.



## Metal Can

Robust infrared emitters, photodiodes and phototransistors with metal can package for harsh environments.

## Radial

Highly reliable infrared emitters, photodiodes and phototransistors in various radial package variants offer flexibility in design and a narrow viewing angle.



## MIDLED

The reflector-based package of MIDLED® infrared emitters and phototransistors offer a narrow viewing angle in an ultra-flat package.

## DIL SMT & SMART DIL

High-quality photodiodes and phototransistors in surface mount package offering high flexibility in design with various variants, such as single or multiple silicon types or package with daylight filter.

