



Light is security

Selection Guide and Product Portfolio
for Infrared Vision Applications

Light is **OSRAM**

OSRAM
Opto Semiconductors



Realizing new visions with infrared light

Designers and manufacturers of “invisible” IR based applications clearly benefit from OSRAM Opto Semiconductors’ high quality infrared components, allowing high system efficiency along with low total system costs.

OSRAM Opto Semiconductors delivers a complete and broad portfolio of innovative infrared LEDs in every performance class. Our products combine the competence of nearly 40 years of expertise in the semiconductor industry with 100 years of experience in lighting technology from OSRAM GmbH. All opto semiconductor processes are concentrated 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 has become today’s reality.

Infrared Illumination for Security Applications

OSRAM Opto Semiconductors is a well established and leading supplier for a variety of security applications with a long business experience in the industry. Among others, our products find use in the following applications:

- **Security Applications for Indoor and Outdoor**
Use cases vary from public places security applications to indoor security monitoring up to smart door bells and many more.
- **Number Plate Recognition**
Identifying the owner of a car by scanning the number plate, which finds use e.g. on highways and parking houses for automated pay systems.
- **Traffic Control**
Traffic monitoring for example for toll systems on highways and pay roads, but also traffic monitoring at busy roads and intersections, for example for automatic traffic light control.



Infrared Illumination for Mobile and Wearables

Biometric Identification applications in our daily lives are emerging – e.g. imagine paying your groceries using your finger print or via 2D face recognition. Although this makes our daily lives much more convenient, it also increases the risk in terms of data security. OSRAM Opto Semiconductors infrared LEDs offer the highest reliability and efficiency to ensure a perfect precision on the biometric picture. supporting different methods of biometric identification, such as:

- Finger Print Scanning
- 2D Facial Scanning
- Palm Vein Scanning
- High Power Eye Tracking



Industrial Applications

There a a lot of other applications requiring infrared illumination beyond those mentioned above. For example in the industrial area, in which the degree of automation continues to increase, and increasingly more robots and machines are used.

- IR Illumination – CCTV
- Machine Vision – Quality Control
- Machine Vision – Industrial Automation
- Time of Flight – Drones
- Time of Flight – People Counting



The right IR LED for each application requirement

Infrared illumination applications come with different requirements towards the light source. OSRAM Opto Semiconductors supports customers in finding the right IR LED for each application requirement. In the following section the most important aspects to take into consideration are highlighted.

System Requirements – Long range vs. Short range

Depending on the distance illuminated, the system requires different output power and field of views towards 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, such like traffic monitoring and outdoor security applications.

The portfolio offered by OSRAM Opto Semiconductors holds various options of output power classes and viewing angles to ensure meeting application specific requirements.

Wavelength, Visibility and Camera Sensitivity

The wavelength and visibility of the light source and the associated camera sensitivity is an important factor to be considered when choosing the IR LED for each application. OSRAM Opto Semiconductors offers infrared LEDs in the wavelength spectrum of 850 nm and 940 nm, each of those having several advantages, but there is a trade off between visibility and camera sensitivity that needs to be evaluated.

850 nm
850 nm is the most common option for most applications because it is barely visible by humans and still offering a high signal on the detecting side. Nevertheless, when looking directly into the light source, a faint red glow can be still perceived. So there is a trade-off between high camera sensitivity, which is roughly 40% higher than in the 940 nm spectrum, and the remaining red glow. Therefore, the 850 nm IR LEDs are recommended for standard CCTV applications as well as machine vision or night vision applications.

940 nm
For applications in which the red glow could be disturbing or not desirable, the longer wavelength of 940nm is used. These are practically invisible to humans (100 times less than 850). It is still visible by cameras, but the signal is reduced by 60% as compared to 850nm. Hence, the 940 nm IR LEDs are the perfect choice when it comes to covert observation, automotive interior applications or Indoor CCTV.

Operation Mode

DC vs. pulsed operation
OSRAM Opto Semiconductors IR LEDs are designed for both – DC and pulsed operation. That means specifically that the chips for DC operation can be driven for longer time with a stable performance, while chips for pulsed operation can be driven up to a very high current and require a very high reliability. For applications requiring DC operation mode (e.g. standard security applications), recommended IR LEDs are equipped with our advanced (stack) high brightness optimized chips, recognizable by the "A(S)" in the nomenclature.

For applications requiring pulsed operation (e.g. Time of Flight), we recommend IR LEDs with high current optimized chips, i.e. stack technology chips, recognizable by the "S" in the nomenclature.

Continuous operation vs. temporary operation
Requirements towards the light source differ depending from the operating mode: for LEDs used in continuous operation an outstanding reliability as well as long lifetime of LEDs is essential. LEDs 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.

OSRAM Thinfilm Chip Inside

Today, the Thinfilm Technology has emerged to an industry standard. OSRAM Opto Semiconductors being the technology leader for infrared emitting LEDs developed and continuously enhanced and improved this technology enabling mass production of thinfilm emitters with increased performance. By today, most of the infrared emitting LEDs in our portfolio have the 6th generation of thinfilm chips inside, resulting in a steady increase in optical output power whilst shrinking in size.

What makes IR thinfilm emitters so special in terms of performance?

- Radiation is generated within a film of 10µm thickness
- Improved efficiency due to reduced absorption behaviour
- Backwards emitted light is reflected by a metal mirror layer
- Improved extraction of radiation as the angles of internal reflection are randomized by textured surface
- and the radiation is emitted at the top surface only
- Due to these benefits a thinfilm emitter has roughly 3 times higher emission compared to a standard volume emitter!



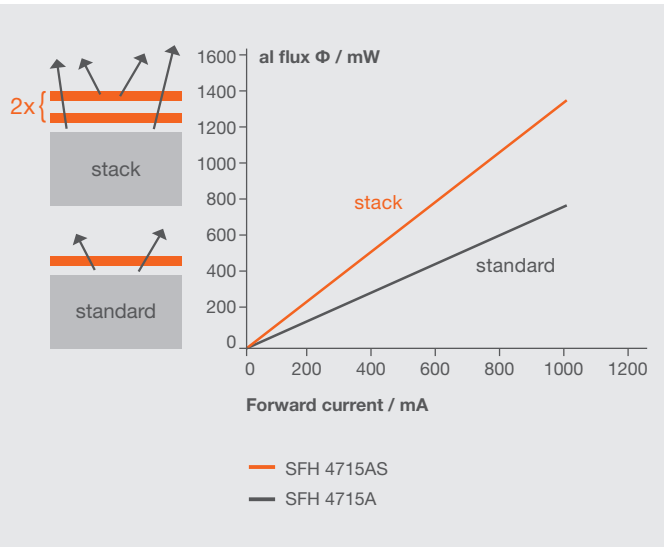
Stack Technology

Requirements towards the light source 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 more narrow field of view to illuminate a larger area.

OSRAM Opto Semiconductors invented the so called Stack Technology – by placing two P/N junctions in series within one chip, a optical output power increase of almost 100% is achieved. Most of our LEDs are available as Stack and Non-Stack version.

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

- space saving as less components are needed to achieve the same efficiency
- higher radiant flux and higre output power
- illumination of longer distance possible



The IR OSLON® Black series – great variety and power options to meet different requirements

IR OSLON® Black Series are very 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). The devices combine very high total optical flux and small packages with a footprint of only 3.85 × 3.85 mm² for very dense packing. Further benefits include a very high total radiant flux at 1 A DC, low thermal resistance for operation at elevation ambient temperature and high current DC operation.

Features and Benefits

- Two chip options available – optimized for high pulse and high brightness operation
- Two wavelength options: 850 nm for high camera sensitivity and 940 nm for reduced red glow
- Integrated optics in three different half angles of ±25°, ±45° and ± 75° enable adaption to the needs of the application
- Wide temperature range of -40° to 125° allows for use in demanding and/or extremes in temperature environment

Applications

- Infrared Illumination
- 2D Face Recognition
- CCTV cameras – long range and short range
- Home Security
- Machine Vision
- Number Plate Recognition

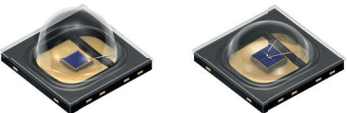


IR OSLON® Black



High Current optimized	SFH 4715S*	SFH 4716S*	SFH 4717S*	SFH 4725S	SFH 4726S	SFH 4727S
Centroid Wavelength (nm)	850	850	850	940	940	940
Radiant Flux (mW) @1 A, tp=100 µs	1360	1360	1230	1340	1340	1230
Radiant Intensity (mW/sr) @1A, tp=10 ms	770	280	1000	760	280	1000
Forward Voltage (V)	2.95	2.95	2.95	2.65	2.65	2.65
Half Angle	±40°	±75°	±25°	±40°	±75°	±25°
Package Dimensions (mm³)	3.85 x 3.85 x 2.41	3.85 x 3.85 x 1.51	3.85 x 3.85 x 2.66	3.85 x 3.85 x 2.29	3.85 x 3.85 x 1.51	3.85 x 3.85 x 2.66

*also available with AEC Q101 Qualification



High Brightness Optimized – 30 mil Chip	SFH 4713A	SFH 4714A
Centroid Wavelength (nm)	850	850
Radiant Flux (mW) @1 A, tp=100 µs	790	760
Radiant Intensity (mW/sr) @1A, tp=10 ms	420	165
Forward Voltage (V)	1.75	1.75
Half Angle	±40°	±75°
Package Dimensions (mm³)	3.85 x 3.85 x 2.29	3.85 x 3.85 x 1.51



High Brightness Optimized – 40 mil Chip	SFH 4715A	SFH 4716A	SFH 4715AS*	SFH 4716AS*
Centroid Wavelength (nm)	850	850	850	850
Radiant Flux (mW) @1 A, tp=100 µs	860	740	1530	1530
Radiant Intensity (mW/sr) @1A, tp=10 ms	500	150	900	350
Forward Voltage (V)	2.05	2.05	3.3	3.3
Half Angle	±40°	±75°	±40°	±75°
Package Dimensions (mm³)	3.85 x 3.85 x 2.29	3.85 x 3.85 x 1.51	3.85 x 3.85 x 2.29	3.85 x 3.85 x 1.51

*also available with AEC Q101 Qualification

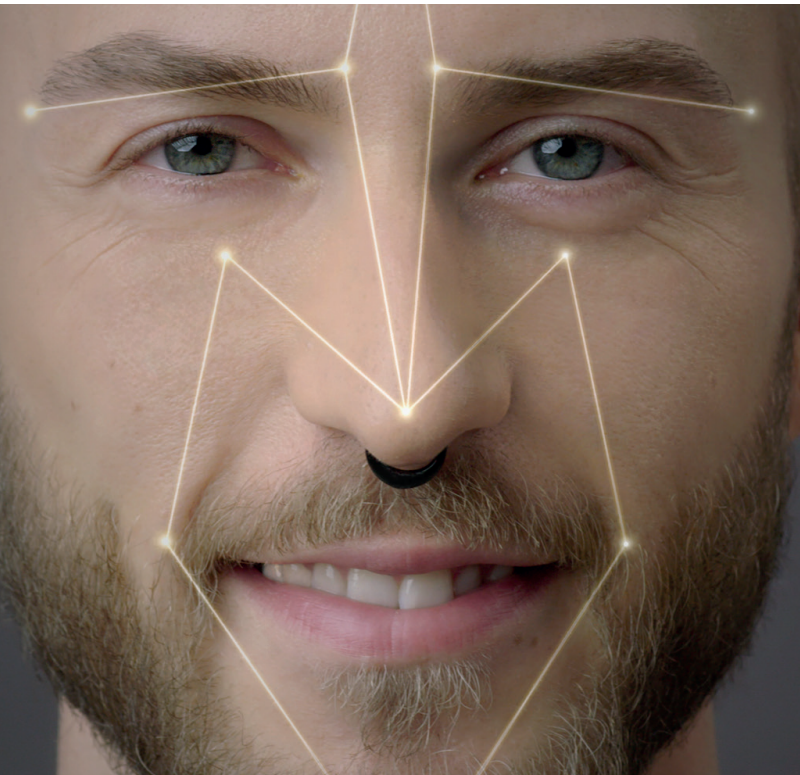


High Brightness Optimized – 40 mil Chip	SFH 4717AS*	SFH 4725AS*	SFH 4726AS*	SFH 4727AS*
Centroid Wavelength (nm)	850	940	940	940
Radiant Flux (mW) @1 A, tp=100 µs	1340	1580	1580	1340
Radiant Intensity (mW/sr) @1A, tp=10 ms	1150	900	350	1150
Forward Voltage (V)	3.3	3.05	3.05	3.05
Half Angle	±25°	±40°	±75°	±25°
Package Dimensions (mm³)	3.85 x 3.85 x 2.66	3.85 x 3.85 x 2.29	3.85 x 3.85 x 1.51	3.85 x 3.85 x 2.66

*also available with AEC Q101 Qualification

SYNIOS® P2720 – Combining compact footprint with high power emission

OSRAM Opto Semiconductors offers extremely compact high-power SYNIOS® IR LED for industry, consumer and automotive applications. The products impress with a very low height, which makes them ideal for narrow applications that nevertheless require high efficiency. The products do not have an integrated lens, but secondary optics for narrow beam angles are available.



- Features and Benefits**
- Infrared lightsource with high efficiency
 - Highest optical output due to double stack emitters inside
 - Two wavelength options available: 850 nm for high camera sensitivity and 940 nm for reduced red glow
 - 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 very limited space
- Applications**
- Safety and Security Applications
 - 2D Facial Recognition
 - Gesture Recognition
 - Eye Tracking



SYNIOS® P2720		
	SFH 4770S*	SFH 4775S*
Centroid Wavelength (nm)	850	940
Radiant Flux (mW) @1A, tp=10 ms	1360	1150
Radiant Intensity (mW/sr) @1.5A, tp=100 µs	620	545
Forward Voltage (V)	3.15	2.95
Half Angle	±60°	±60°
Package Dimensions (mm³)	2.75 x 2.00 x 0.60	2.75 x 2.00 x 0.60

*also available with AEC Q101 qualification in Fußnote

OSLON® P1616 – Top performer with a superior package size to performance ratio

The OSLON® P1616 products are the latest addition to the (near) infrared high power LED product portfolio of OSRAM Opto Semiconductors. With a package size of only 1.6 x 1.6 mm² 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 field.

- Features and Benefits**
- Super small package with only 1.6 x 1.6 mm² enabling use in space critical applications
 - Nanostack Technology for higher output – increase output by almost 100%
 - Lensed and unlensed options available to meet different application requirements
 - Two wavelength options: 850 nm for high camera sensitivity and 940 nm for reduced red glow
- Applications**
- Biometric Identification for Access Control
 - User Authentication with 2D Face Recognition, e.g. Laptops and Smart Doorbells
 - Infrared Illumination Applications

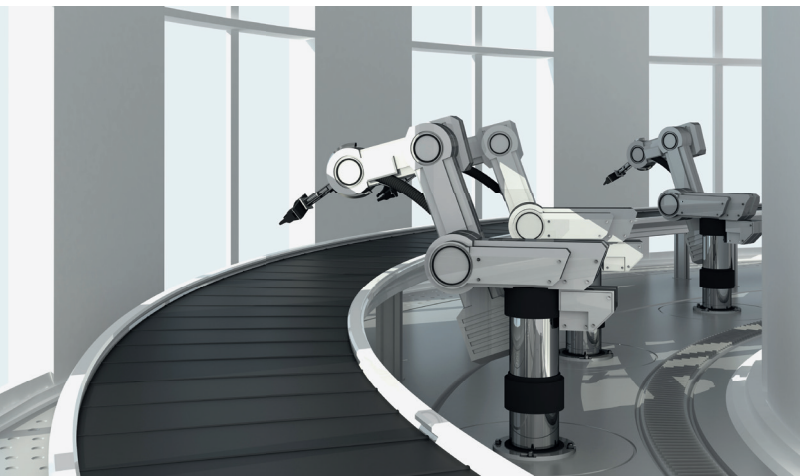


OSLON P1616 – unlensed devices		
	SFH 4170S	SFH 4180S
Centroid Wavelength (nm)	850	940
Radiant Flux (mW) @1A, tp=10 ms	1150	1150
Radiant Intensity (mW/sr) @1A, tp=100 µs	280	280
Forward Voltage (V)	3.25	2.95
Half Angle	±65°	±65°
Package Dimensions (mm³)	1.60 x 1.60 x 0.81	1.60 x 1.60 x 0.81

OSLON P1616 – lensed devices		
	SFH 4171S	SFH 4181S
Centroid Wavelength (nm)	850	940
Radiant Flux @1A, tp=10 ms	1150	1150
Radiant Intensity @1A, tp=10 ms	680	680
Forward Voltage	3.25	2.95
Viewing Angle	±35°	±35°
Package Footprint	1.60 x 1.60 x 1.71	1.6 x 1.6 x 1.71

IR Power TOPLED® – Well established product family

The IR Power TOPLED® is the industry standard footprint set by OSRAM Opto Semiconductors. The broad range of different lens options – with +-15° as the most narrow viewing angle in an SMT package in our portfolio up to broad viewing angles – make the 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 Levelling
 - Gesture Recognition
 - Biometric Identification for Access Control, e.g. Fingerprint Scanning

IR Power TOPLED®



	SFH 4250	SFH 4240	SFH 4258	SFH 4259	SFH 4248	SFH 4249
Centroid Wavelength (nm)	850	940	850	850	940	940
Radiant Flux (mW)	60	55	70	70	65	65
Radiant Intensity (mW/sr) @100mA, tp=20 ms	20	18	110	55	100	50
Forward Voltage (V)	1.5	1.5	1.5	1.5	1.5	1.5
Half Angle	± 60	± 60	± 15	± 25	± 15	± 25
Package Dimensions (mm³)	3.5 x 2.8 x 1.9	3.5 x 2.8 x 1.9	3.5 x 2.8 x 3.8	3.5 x 2.8 x 3.5	3.5 x 2.8 x 3.8	3.5 x 2.8 x 3.5



Stack technology	SFH 4250S	SFH 4258S	SFH 4259S
Centroid Wavelength (nm)	850	850	850
Radiant Flux (mW)	100	115	115
Radiant Intensity (mW/sr) @100mA, tp=20 ms	30	185	85
Forward Voltage (V)	3.1	3.1	3.1
Half Angle	± 60	± 15	± 25
Package Dimensions (mm³)	3.5 x 2.8 x 1.9	3.5 x 2.8 x 3.8	3.5 x 2.8 x 3.5

Choose perfection easily – Selection guide for IR Illumination applications

Selection Guide

	OSLON® Black	SYNIOS® P2727	OSLON® P1616	Power TOPLED®
Infrared Illumination for Security Applications				
Industrial Security				
Long Distance Illumination	✓	✓	✓	✓
Mid to short distance illumination	✓	✓	✓	✓
People Counting	✓	✓	✓	
Home Security				
Smart Door Bell	✓	✓	✓	
Home CCTV	✓	✓	✓	✓
Baby Monitoring	✓	✓	✓	✓

Infrared Illumination for Mobile and Wearables				
Vein / Fingerprint Recognition	✓	✓	✓	✓
2D Facial Recognition		✓	✓	
High Power Eye Tracking	✓	✓	✓	
Augmented Reality	✓		✓	
Camera Illumination	✓		✓	

Infrared Illumination for Industrial Applications				
Drones	✓			
Machine Vision – Quality Control	✓			✓
Machine Vision – CCTV	✓		✓	✓
Traffic Control	✓	✓	✓	
Automated Number Plate Recognition	✓	✓	✓	✓

Asia

OSRAM Opto Semiconductors Asia Ltd.
16/F China Resources Building
26 Harbour Road, Wan Chai
Hong Kong SAR
Phone: +852 3652 5522
Fax: +852 2802 0880
E-mail: prasia@osram-os.com

Europe

OSRAM Opto Semiconductors GmbH
Leibnizstraße 4
D-93055 Regensburg, Germany
Phone: +49 941 850 1700
Fax: +49 941 850 3302
E-mail: support@osram-os.com

USA

OSRAM Opto Semiconductors Inc.
1150 Kifer Road, Suite 100
Sunnyvale, CA 94086, USA
Main Phone number: (408) 962-3700
Main Fax: (408) 738-9120
Inbound Toll Free: (866) 993-5211
E-mail: info@osram-os.com



OSRAM
Opto Semiconductors