Product Document

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Infrared LED and VCSEL Illuminators for In-Cabin Sensing

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- Market Leader in In-Cabin IR Illumination
- Multiple wavelength and field-of-illumination options
- Full in-house design for high efficiency and reliability
- Industry's first AECQ-102 and ISO26262 compliant VCSELs

Sensing is life

ams OSRAM

OSLON® Black, SYNIOS, OSLON® Piccolo
Infrared LED Illuminators

General Description

ams OSRAM Infrared LED Illuminators are designed for automotive In-cabin Sensing applications such as Driver Monitoring, Cabin Monitoring and Gesture Sensing and come in 3 different configurations, making it easy for the customers to choose the best-fit to their system.

The flagship OSLON® Black family is optimized for high-current / high optical-power operation and has been the market leader in In-cabin Sensing illumination with a strong track record. SYNIOS® offers similar optical performance without an additional lens, making it suitable for systems using customized optics.

OSLON® Piccolo family targets systems with high cost sensitivity and space constraints. All IR LED modules and sub-components are designed and manufactured in-house by ams OSRAM, thanks to the industry-leading high-volume automotive production competence.

Applications

- Optical in-cabin sensing systems
- Driver monitoring
- Interior monitoring
- Gesture sensing

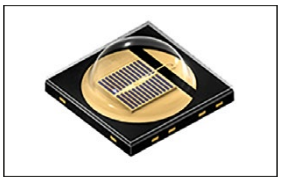
940 nm Selection

	OSLON® Black					SYNIOS®	OSLON® Piccolo	
	SFH 4728AS A01	**SFH 4725AS A01**	**SFH 4726AS A01**	**SFH 47278AS A01**	**SFH 47267AS A01**	**SFH 4775S A01**	**SFH 4180S A01**	**SFH 4181S A01**
FOI Angle (FWHM*)	50°	80°	150°	155° x 130°	135° x 110°	120°	130°	70°
Ie @ 1.5A / 25°C, typ. (mW/sr)	1980	1140	440	450	470	530	420	1020
Φe @ 1.5A / 25°C, typ. (mW)	1910	1970	1970	1970	1900	1650	1610	1610
Max. pulse current (A)	5					5	2	
Forward voltage @ 1.5A / 25°C, typ. (V)	2.75					2.75	2.95	
Op. Temperature (°C)	-40 to 125					-40 to 125	-40 to 125	
Footprint (mm²)	3.85 x 3.85					2.8 x 2.0	1.60 x 1.60	
AEC Qualification Level	Q102	Q101	Q101	Q102	Q102	Q101	Q102	

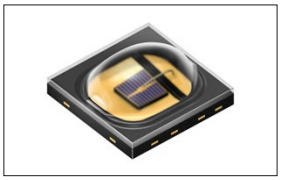
850 nm Selection

	OSLON® Black			SYNIOS®	OSLON® Piccolo
	SFH 4718AS A01	**SFH 4715AS A01**	**SFH 4716AS A01**	**SFH 4770S A01**	**SFH 4170S A01**
FOI Angle (FWHM*)	50°	80°	150°	120°	130°
Ie @ 1.5A, typical (mW/sr)	1980	1150	440	530	420
Φe @ 1.5A, typical (mW)	1910	2015	2015	1700	1610
Max. pulse current (A)	5			5	2
Forward voltage @ 1.5A (V)	3,05			3,05	3,25
Op. Temperature (°C)	-40 to 125			-40 to 125	-40 to 125
Footprint (mm²)	3,85 x 3,85			2,8 x 2,0	1,60 x 1,60
AEC Qualification Level	Q102	Q101	Q101	Q101	Q102

*) Full-Width at Half-Maximum



OSLON® Black SFH 4726AS A01



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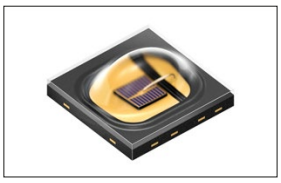
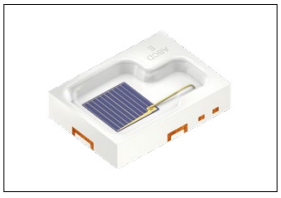
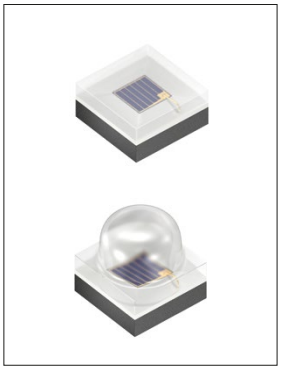


OSLON® Black SFH 47267AS A01



SYNIOS®



OSLON® Piccolo

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TARA2000-AUT & TARA2000-AUT-SAFE
Infrared VCSEL Illuminators

TARA2000-AUT

The TARA2000-AUT is designed for the new generation of 2D and 3D optical in-cabin Sensing applications, where high power illumination and high signal-to-noise ratio is required in any circumstance. VCSEL based illumination enables maximum image quality, reducing the PCB footprint, and combined with a narrow spectral bandwidth ensures high immunity against sunlight and sunglass reflections inside the vehicle.

The ultra-compact module is designed and manufactured with ams' state-of-the-art opto-electronics component manufacturing processes and is AECQ-102 and ISO26262 compliant, a first in its class. TARA2000-AUT can be used both for 2D NIR-Imaging and for 3D sensing systems such as time-of-flight and stereo vision. Different wavelength options offer flexibility to customers using different optical systems, and multiple FOI options make it the ideal fit for driver monitoring, interior monitoring, or gesture sensing.

New: TARA2000-AUT-SAFE

The TARA2000-AUT-SAFE comes with an upgraded packaging and an integrated eye-safety functionality that is more reliable and cost-efficient than existing methods.

The TARA2000-940-W-AUT-SAFE, which has a wide field of illumination of 116° x 87°, is optimized for cabin monitoring with 2D near infrared (NIR) imaging and 3D indirect time-of-flight (iToF) cameras. A forthcoming version with a narrow field of illumination of 46° x 41°, the TARA2000-940-UN-AUT-SAFE, is suitable for driver monitoring.

The new device's resistive interlock circuitry is integrated on the MLA (Micro-Lens Array). Providing a near-instant response (<1µs) to fault conditions, the TARA2000-AUT-SAFE can directly detect faults that could compromise eye safety, such as diffuser cracking or shear-off.

The fast and reliable response is in contrast to the existing built-in photodiode method for eye safety protection, where the photodiode signal is prone to faults caused by non-eye-safety related factors such as reflective objects in front of the VCSEL module. Also, the TARA2000-AUT-SAFE's interlock loop is easier to integrate, as its read-out circuit only requires one AND gate or MOSFET. In comparison, complex read-out circuit of photodiode requires a higher number of components resulting in a higher bill-of-materials cost, as well as a slower response to events that carry a risk to eye safety.

In addition, the photodiode's response is strongly temperature-dependent making system design more complex and less reliable for automotive applications, which are exposed to a wide range of operating temperatures.

	TARA2000-AUT	TARA2000-AUT-SAFE
Package	4.1 x 4.1 x 1.38 mm QFN	4.0 x 4.0 x 1.21 mm QFN / Ceramic
Wavelength options	850nm & 940 nm	940 nm
Field of illumination (typical)	UW: 129.5° x 114.5° @850nm UW: 125.5° x 111.5° @940nm N: 59° x 42° UN: 46° x 41°	W: 116° x 87° UN: 46° x 41° (upcoming)
Optical peak power	~4W @100us / 2% / 5A / 25°C ~2W @100us / 2% / 5A / 125°C	~4W @100us / 2% / 5A / 25°C ~2W @100us / 2% / 5A / 125°C
Power Conversion Efficiency	~35% @100us / 2% / 5A / 25°C	~35% @100us / 2% / 5A / 25°C
Operating temperature range	-40°C to 105°C	-40°C to 125°C
Integrated eye safety feature	No	Yes
Automotive qualification	AEC-Q102 – grade 2	AEC-Q102 – grade 1
ISO26262 qualification	ASIL A	ASIL A
Unit-level traceability	2D barcode on MLA	2D barcode on MLA
Moisture Sensitivity Level	3	2

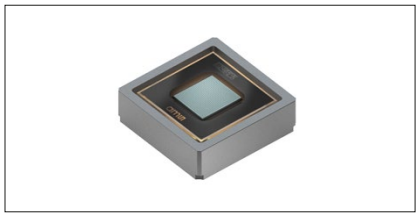
VCSEL Benefits

- Highly uniform illumination for better image quality
- Narrow spectral bandwidth (<3nm) and less temperature shift for robustness against sunlight
- Less visible red glow due to less bandwidth spread close to human eye range
- Short rise & fall times (<1 ns) enabling higher modulation frequencies (100< MHz) and higher depth resolution for 3D iToF Systems

Applications

- Optical in-cabin sensing systems
- Driver monitoring
- Interior monitoring
- Gesture sensing

TARA2000-AUT



TARA2000-AUT-SAFE

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