

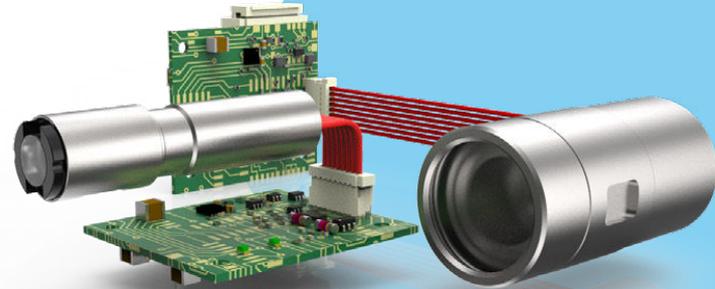
Product Family ZXS-OEM

The optimal laser for sophisticated triangulation sensors

The structured light laser ZXS sets new standards for machine vision illumination due to its automated production in which all optical components are aligned by a high-accuracy robotic process.

The focusing optics achieves a boresight error of less than 0.8 mrad

The separated electronics enables the user to mount the laser individually. An OEM-Version with a customized electronics for the integration onto an existing PCB is also available.



Boresight Accuracy



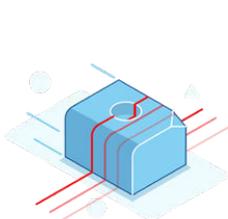
High Process Reliability



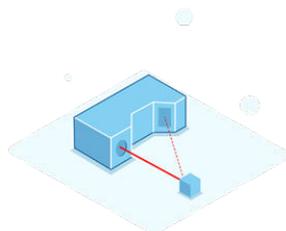
Output Power up to 200 mW

Highlights

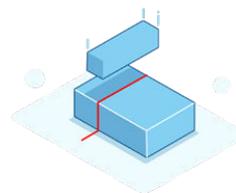
- Industrial standard
- Repeatable product performance due to automated production processes
- Highest reproducibility of beam quality
- Optical output power up to 200 mW
- Wavelengths from 405 – 830 nm
- Manually focusable (ZXS20)
- TTL modulation up to 150 kHz
- Analog intensity control



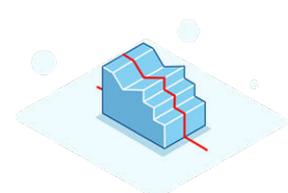
Machine Vision



Triangulation Sensors



High-Precision Positioning Tasks



3D-Measurement

Order Code

Z??	XS20	?	?	?	?
Power	Product family Size of head	Electronics	F-Focusable	Wavelength	Optics

System specifications

Wavelength	nm
Wavelength tolerance	nm (typical)
Wavelength drift	nm / K (typical)
Output power ZXS10	mW
Output power ZXS20 (elp)	mW
Output power ZXS20 (flp)	mW
Spatial mode	(typical)
RMS noise (20 Hz to 20 MHz, typical)	%
Peak-to-Peak Noise (20 Hz to 20 MHz, typical)	&
Boresight error ⁽¹⁾	mrad (typical)
Line orientation ⁽²⁾	mrad
Pointing stability	μrad / K
Long-term power stability (24h)	%
Start-up time	sec
Laser operation mode	

405	450	520	640	660	685	785	830
±10	±10	-5 +10	±10	±10	±10	±10	±4
0,06	0,02	0,06	0,25	0,25	0,25	0,25	0,25
n. a.	≤ 45	≤ 35	≤ 100	≤ 100	≤ 100	≤ 100	≤ 100
≤ 160	≤ 60	≤ 40	≤ 70	≤ 160	≤ 40	≤ 80	≤ 200
≤ 120	≤ 45	≤ 30	≤ 120	≤ 120	≤ 120	≤ 90	≤ 150

Single Transverse Mode

< 0.5

< 1 %

< 0.8 (fixed focus)

< 10

< 10

±3 over operating temperature range

< 2

APC

Electrical specifications

Operating voltage	VDC
Operating current (max. at 25 °C)	mA
Protection	
Electrical isolation	
Connection	
Power consumption	W
Communication interfaces	

9 - 30	9 - 30	9 - 30	5 - 30	5 - 30	5 - 30	5 - 30	5 - 30
< 300	< 300	< 300	< 500	< 500	< 500	< 500	< 500

Over temperature protection and LED pre-failure indicator, reverse polarity and transient protection (ESD, burst & surge)

Potential-free housing

JST-BM08B-ZESS-TBT

< 2.7	< 2.7	< 2.7	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
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I²C, RS-232 (5 V)

Optical specifications

Fan angles ⁽³⁾	Degrees °
Line straightness ⁽⁴⁾	% (of line length)
Line uniformity ⁽⁵⁾	% (typical)
Dot	
DOE	
Focus range (only available as fixed focus)	mm

5, 10 | 20, 30, 45, 60, 75, 90 (homogeneous line)

< 0.08 | < 0.05

< 25

Point elliptical

Multi line, crosses, grids, etc.

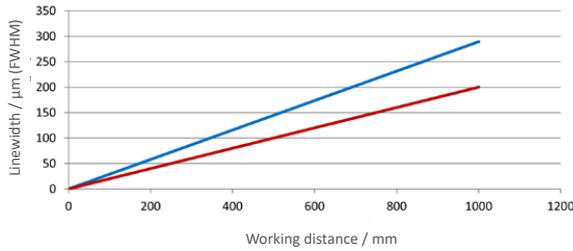
< 100 up to 10,000

< 100 up to 980 (5° fan angle)

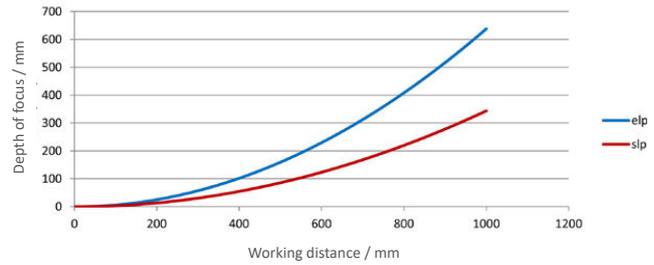
Keynotes

(1) Boresight error	Also known as pitch and skew.
(2) Line orientation	Also known as line tilt (roll) with reference to the indentation in the clamping area
(3) Line length / fan angle	at > 13.5 % I _{max}
(4) Line straightness	Deviation from best fit line over the middle 80% of the line, for homogeneous lines
(5) Line uniformity	Maximum relative optical power variation over the middle 80% of the line, for homogeneous lines and fixed focus

Line thickness vs. working distance*



DOF vs. working distance*



Wavelength	Calculation factor for line width		Calculation factor for depth of focus	
	<i>slp</i>	<i>elp</i>	<i>slp</i>	<i>elp</i>
Blue 405 nm	0.62	0.82	0.70	1.02
Blue 450 nm	0.67	1.83	1.74	4.29
Green 520 nm	0.78	1.20	0.80	2.61
Red 640 nm	1.28	1.00	1.70	0.95
Red 660 nm	1.00	1.00	1.00	1.00
Red 685 nm	1.68	1.40	1.97	1.99
IR 830 nm	1.30	2.11	1.03	2.20

Optical configurations for several line settings are available.

- *slp* = standard line Powell; standard setup with medium line thickness and depth of focus.

- *elp* = extended line Powell; lines with advanced depth of focus and thicker lines. Recommended for fan angles > 75° at working distances < 500 mm.

The graphs above show the values for line width and depth of focus of a 660 nm laser. To get the values for a different wavelength the factor from the table above has to be multiplied by the values from the graphs.

Example: 660 nm laser focused at 500 mm working distance: line width approx. 150 μm (@ *elp* optic); Depth of focus approx. 175 mm (values from the graphs)

Calculated: 405 nm laser focused at 500 mm working distance: line width approx. 150 μm x 0.82 = 123 μm; Depth of focus approx. 175 mm x 1.02 = 179 mm

* Values in the graphs for homogenous line profiles

** Fan angle: 10° - 90°

Software

GUI
Serial communication
I²C, RS-232 (5 V)

- Features (e. g.):
- Status query
 - Output power control
 - System configuration
 - Digital Modulation
 - Intensity control
 - Weighted end of life indication

Digital modulation

Maximum frequency	kHz	up to 150
Rise time (Mod High ⇒ 90%)	ns	< 160
Fall time (Mod Low ⇒ 10%)	ns	< 100
Signaling levels	V	V _{IL_max} < +0.9 V _{IH_min} > +2.2
Operation range	VDC	0 - 30

Analog modulation

Maximum bandwidth	Hz	< 10
Linearity	%	< 5 (from 10 % to 100 % of laser power)
Active range	VDC	0 - 2
Impedance		100 kΩ to internal VCC (3.3 V)
Operation range	VDC	0 - 30

Environmental conditions

Operating temperature	°C / °F
Storage temperature	°C / °F
Humidity	%
Dissipated heat	W

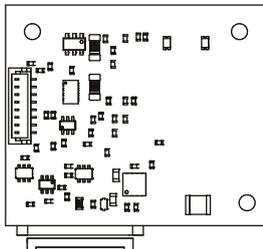
-10 °C to +50 °C / 14 °F to +122 °F
-40 °C to +85 °C / -40 °F to +185 °F
< 90 %, non-condensing
Max. 4 W

Mechanical Specifications - DEPENDING ON LASER HEAD VERSION

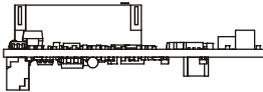
Length optic head	mm / inch	ZXS10-OEM 40 / 1.57	ZXS20-OEM 38 / 1.5	ZXS20-F-OEM 98 / 3.86
Diameter head ϕ	mm	ϕ 10h7	ϕ 20h7	ϕ 20h7
Length of cable between optics and electronics	mm / inch	100 / 3.53 (others on request)		
Driver electronics	mm / inch	34 x 33 / 1.34 x 1.3	34 x 29 / 1.34 x 1.14	
		with connector	without connector	
Material		Stainless steel (laser head) / aluminum (housing of electronics)		
Protection class		IP 50 (IP 67 optional)	IP 67	IP 67

Driver electronics

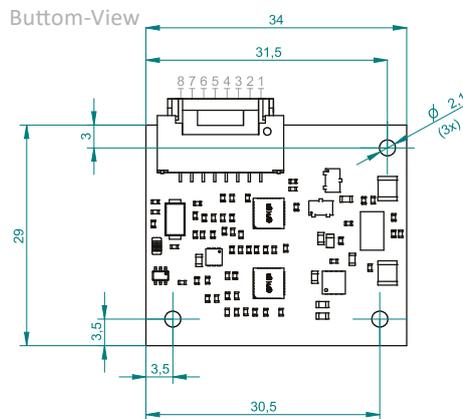
Top-View



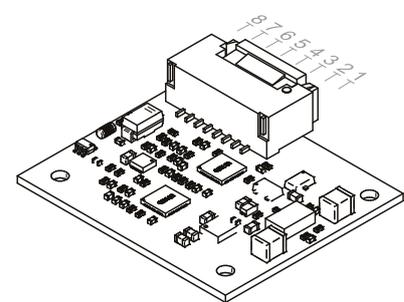
Side-View



Bottom-View



Bottom-View isometric



PinOut driver electronics

1	Black	GND	Ground
2	Red	V_IN	5...30 VDC (635...830 nm), 9...30 VDC (405...520 nm)
3	Brown	UART_RXD	Laser Out, Master In
4	Yellow	Analog Mod	Analog voltage (0...5 VDC)
5	Purple	Digital Mod	Digital Modulation TTL (3,3...30V, active high)
6	Black	UART_TXD	Laser In, Master Out
7	Green	SDA	TWI-Signal (I ² C): Serial Data
8	White	SCL	TWI-Signal (I ² C): Serial Clock

PinOut 6-lead cable without driver electronics

1	brown	405 nm - 520 nm: 9 - 30 VDC, 15 VA	635 nm - 830 nm: 5 - 30 VDC, 15 VA
2	orange	Digital modulation TTL	
3	black	GND	
4	yellow	Analog modulation (0-2 VDC)	
5	green	Fail out (open-drain)	
6	red	Shielding	

Coding scheme shows default configuration at delivery, individual setup possible.