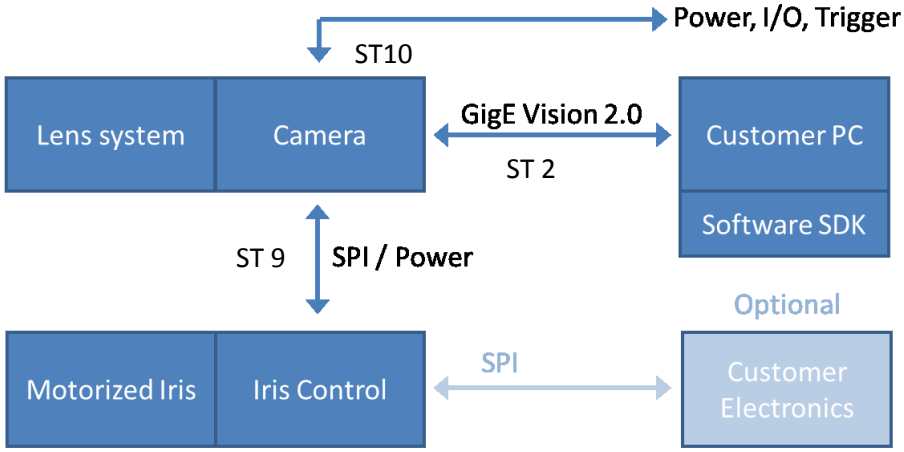
1 System Overview

The **Slimline** System consists of the following parts:

- Lens system with motorized iris
- Camera connected over GigE to customer PC. Optional hardware signals to synchronize with X-ray source
- Iris control connected to the camera or optional connected to customer electronics
- Software SDK and quick start application for easy integration into customer system



2 Lens system

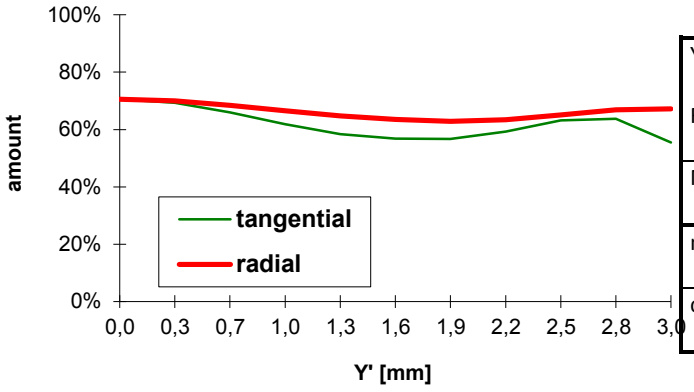
2.1 Optical data

Subject	Symbol	Min.	Typ.	Max.	Unit
Focal length	f'	6.57	6.64	6.71	mm
F-numbers in application as sin(u')		1 : 17 0.029		1 : 1.84 0.27	
Transmission (P20P)	T	80	90		%
Veiling glare	VG		0.5		%
First plate: (II tube) Thickness	D1	 13.7	14 N-BK10 n = 1.50	 14.3	 mm

Subject	Symbol	Min.	Typ.	Max.	Unit
Second plate: (CCD cover glass)					
		0,5		0.80	
Thickness	D2	IMX 249			mm
Refractive index at					
λ = 546.1 nm	ne		1,5255		
λ = 588 nm					
	nd		1,5231		

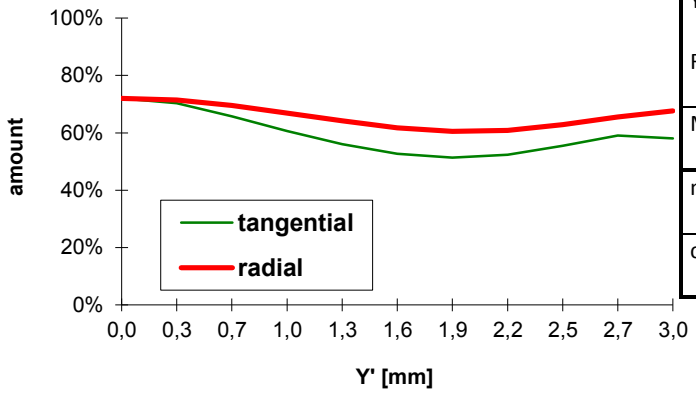
2.2 Modulation Transfer Function

Calculated values for 85 Lp/mm (Sony IMX 249)
Object size Ø 25.1



Y' [mm]	0	2.253	2.930
Rel.	0	0,8	1.0
MTF	amount	amount	amount
min	40 %	25%	20%
calc	70 %	63 %	55 %

Calculated values for 85 Lp/mm (Sony IMX 249)
Object size Ø 20

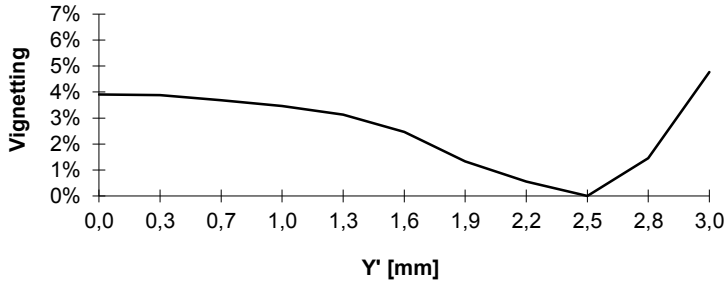


Y' [mm]	0	2.458	3,00
Rel.	0	0,8	1.0
MTF	amount	amount	amount
min	40 %	25%	20%
calc	72 %	55 %	58 %

2.3 Vignetting

Calculated values for Ø 25.1 ➔ Ø 6.0

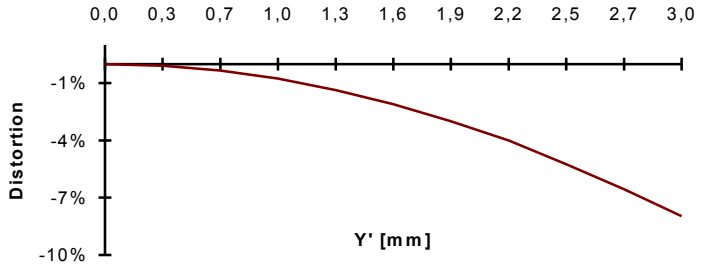
Vignetting max 5% on axis in order to compensate Image Intensifier vignetting partly



2.4 Distortion

Calculated values for Ø 25.1 ➔ Ø 6.0

distortion max. -8,5 % in order to compensate Image Intensifier distortion partly



Vorlage: 4710-001-336-00e
Kennz. n. 3210-007-059-00

EU-D -			AL-T1A -		US-D -	US-ML -	not export controlled
			MED		PDM-Status	Freigabe	-
Rev.	Change	Date	Approved	Prepared 06.04.16 Allersmeier		Specification	Page 3 of 5
a	Erstausg.	06.04.16	Allersmeier	Checked 06.04.16 Gotsch		Title	
b	16-0075	30.08.16	Gotsch			Technical Customer Specification	
c	17-0004	15.03.17	Grahmann				
d	17-0058	01.03.18	B.Hornbog.	QIOPTIQ		Document Number	
						3801-459-405-00-0000d	

3 Camera

Sensor Data

CMOS Sensor	1/1.2” monochrome CMOS Image Sensor (Sony IMX249LLJ)
Pixel size (H x V)	5,86 µm x 5,86 µm
Sensitive area (H x V)	11.34 mm x 7.13 mm
Number of pixels (H x V)	1024x1024 active area
Spectral sensitivity	300nm – 1050nm
Saturation	29000 e-
Filter	none
Dynamic	65 dB

Interface data

Interface	Gigabit Ethernet
Coding	12 Bit monochrome
Camera output format	30 fps
Maximum exposure	1 sec (FoD)
Protocol	GigE Vision 2.0

Camera functions

System	12 Bit digital
Gain	0 to 48 dB
Pixel errors	Correction of up to 255 defect pixels, amount and position recorded
Gamma	Optimizes contrast, values from 0.3 to 1.0
Recursive filter	For noise reduction, depth 1..16, motion detection available
Set_Edge_Enhancement	Activates or deactivates edge enhancement.
Overlay_Line	Draws a line in the next captured image
Overlay_Circle	Draws a circle in the next captured image
Overlay_Text	Draws text in the next captured image
Trigger	Frame on demand with external trigger or software SDK request Free running mode with 30 fps and trigger output for X-ray source
AGC,AEC	Automatic regulation of gain and exposure to predefined brightness values
Spine_Mode	Optimizes acquisition for partly overexposed images (spine, extremities)
Automatic Balance control	Controlling XR source via hardware signals to optimal dose

General technical data

Connectors	ST 2 ➔ RJ 45 with LED (GigE) ST 10 ➔ I/O connector, Molex Microblade 9 Pin (power, trigger and I/O) ST 9 ➔ Motor control, Molex Picoblade 8 pin (camera to iris motor control) See Electrical Interfaces 3801-459-408-20
PCB diameter	96 mm
Temperature	-20°C bis +60°C,
Humidity	30% to 70% (non condensing) operation 10% to 95% (non condensing) transport / storage
Air-pressure	700 hPa to 1060 hPa operation 100 hPa to 1100 hPa transport / storage
Power	12V DC ± 5%, max. 5 W

4 Iris motor control

The motor control is a separate PCB to control the iris. There are two options to communicate with the iris control selected by a DIP switch on the PCB:

- SPI interface on PCB
- GigE: transparent communication channel over the camera GigE interface

SPI interface is used for custom applications. The GigE channel allows to control the iris over the software SDK. The Iris is driven by a DC motor. The position is controlled by a potentiometer.
See manual iris control 3801-459-401-00

5 Software SDK

The software SDK provides functions to control the camera, the motorized iris and some functions for image processing.
The SDK also provides a quick start demo application with source code for easy integration into customer systems.

The SDK is implemented under Microsoft .net-framework for PCs running Microsoft Windows 7 or higher (32 bit or 64 bit).

For details see 3801-459-408-10