



2024

# User Manual for EHD SCM, SCA MaxCam SWIR Machine Vision Cameras



EHD imaging GmbH

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# 1 Introduction to EHD imaging machine vision cameras

## 1.1 Product Description

The cameras mentioned in this manual are imaging capture devices, which use USB3.0 / GigE / CL to transmit uncompressed images in real time. They support image acquisition and parameter setting (such as working mode, image parameter adjustment etc.) through client-side user-friendly software.

SWIR series is a TE-Cooling USB3.0 / GigE / CL interface visible+short-wave infrared camera, which adopts SONY SenSWIR InGaAs sensor. With 400nm-1800nm wide band response or 900nm-1700nm short wave infrared response. This camera has high quantum efficiency and high sensitivity;

IUX series is USB3.0 interface cameras for industrial applications. It includes IUA, IUC and IUD. M means black/white camera and C means color camera which having built-in hardware ISP to ensure color reproduction and higher video speed. The resolution coverage is from 1.7MP to 43MP.

IUA is mainly for the 1/2.8”~1.1”sensor;

IUB is mainly for the GSENSE sensor with sensor size 1/1.1” ~1.7” , has stopped production, products for the corresponding sensor can be found in the IUA series;

IUC is for the APS and full frame sensor;

IUD is a USB3 series camera with near-infrared enhanced global shutter, it can be used for OCT fundus imaging. It is expected to replace foreign GigE interface competing products

## 1.2 Characteristics

- Sony Exmor back-illuminated CMOS sensor; some cameras also use GPixel series sensors and domestic sensors.
- USB 3.0 / GigE /CL data transmission interface compatible with USB2.0 protocol;
- Provides advanced video and image processing application software EHDView, compatible with Windows/Linux/OSX multi-platform SDK, support native C/C++, C#/VB.Net, DirectShow, Twain API;
- Supports external triggering, software and capture modes;
- Supports ROI, flip, bit-depth switching and other features;
- Supports firmware worksite upgrading;
- Compliant with CE, FCC requirements.

## 1.3 SWIR Sony Series Camera Specifications

Model Number	Image Sensor	Pixel Size(μm)	G Sensitivity/Dark Signal	Data Interface	FPS/Resolution	Binning	Exposure Time Dimensions
MaxCam-990TE-TR	1.3M/IMX990(M) 1/2"(6.40x5.12) Buit-in TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	200@1280x1024 392@640x512	1x1 1x1	15us~60s 80mm
MaxCam-990-TR	1.3M/IMX990(M) 1/2"(6.40x5.12) External TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	200@1280x1024 392@640x512	1x1 1x1	15us~60s 80mm

MaxCam-991TE-TR	0.33M/IMX991(M) 1/4"(3.20x2.56) Buit-in TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	400@640x512 753@320x256	1x1 1x1	15us~60s 80mm
MaxCam-991-TR	0.33M/IMX991(M) 1/4"(3.20x2.56) External TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	400@640x512 753@320x256	1x1 1x1	15us~60s 80mm
MaxCam-992TE-TR	5.0M/IMX992(M,GS) 1/1.4"(8.94x7.09) Buit-in TEC	3.45x3.45	TBD	USB3	61.9@2560x2048 135.7@1280x1024	1x1 1x1	15us~60s 80mm
MaxCam-992-TR	5.0M/IMX992(M,GS) 1/1.4" External TEC	3.45x3.45	TBD	USB3	61.9@2560x2048 135.7@1280x1024	1x1 1x1	15us~60s 80mm
SC-990-TR-UMV	1.3M/IMX990(M,GS) 1/2"(6.40x5.12)	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	223@1280x1024 428@640x512	1x1 1x1	15us~60s 33mm
SC-991-TR-UMV	0.33M/IMX991(M,GS) 1/4"(3.20x2.56)	5x5	121mV with 1/30s 1.0mV with 1/30s	USB3	428@640x512 807@320x256	1x1 1x1	15us~60s 33mm
SC-992-TR--UMV	5.0M/IMX992(M,GS) 1/1.4"	3.45x3.45	TBD	USB3	61.9@2560x2048 135.7@1280x1024	1x1 1x1	15us~60s 33mm
MaxCam-990TE-TR-G	1.3M/IMX990(M) 1/2"(6.40x5.12) Buit-in TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	GigE	90@1280x1024 253@640x512	1x1 1x1	15us~60s 80mm
MaxCam-990-TR-G	1.3M/IMX990(M) 1/2"(6.40x5.12) External TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	GigE	90@1280x1024 253@640x512	1x1 1x1	15us~60s 80mm
MaxCam-991TE-TR-G	0.33M/IMX991(M) 1/4"(3.20x2.56) Buit-in TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	GigE	258.8@640x512 486.1@320x256	1x1 1x1	50us~60s 80mm
MaxCam-991-TR-G	0.33M/IMX991(M) 1/4"(3.20x2.56) External TEC	5x5	121mV with 1/30s 1.0mV with 1/30s	GigE	258.8@640x512 486.1@320x256	1x1 1x1	50us~60s 80mm
MaxCam-992TE-TR-G	5.0M/IMX992(M,GS) 1/1.4" Buit-in TEC	3.45x3.45	TBD	GigE	22@2560x2048 88@1280x1024	1x1 1x1	15us~60s 80mm
MaxCam-992-TR-G	5.0M/IMX992(M,GS) 1/1.4" External TEC	3.45x3.45	TBD	GigE	22@2560x2048 88@1280x1024	1x1 1x1	15us~60s 80mm
MaxCam-991TE-TR-10G	5.0M/IMX992(M,GS) 1/1.4" Buit-in TEC	3.45x3.45	TBD	GigE	131.9@2560x2048	1x1 1x1	15us~60s 80mm
MaxCam-991-TR-10G	5.0M/IMX992(M,GS) 1/1.4" External TEC	3.45x3.45	TBD	GigE	131.9@2560x2048	1x1 1x1	15us~60s 80mm

## 1.4 MaxCam-331TE-TR Series Camera Specifications

Order Code	Sensor type and size	Pixel size(um)	Data Interface	Camera Type	FPS/Resolution	Exposure Time
MaxCam-331KMA-CL500	0.33M / 640x512 3/4" (9.60x7.68)	15x15	CameraLink	China produced devices	517@640x512	31.25us~1s
MaxCam-331KMA-CL700				China produced devices	724@640x512	23.81us~1s
MaxCam-331KMB-CL500				Global procurement of key chips	517@640x512	31.25us~1s
MaxCam-331KMB-CL700				Global procurement of key chips	724@640x512	23.81us~1s
MaxCam-331KMB-G125		Buit-in TEC	GigE	Global procurement of key chips	125@640x512	50us~5s
MaxCam-331KMB-G350				Global procurement of key chips	350@640x512	25us~5s
MaxCam-331KMB-G700				Global procurement of key chips	360@640x512 700@320x256	50us~5s

\*Frame rate of MAXCAM-331KMB-G700 is limited by network interface and can only reach 360fps at full resolution. Frame rate can be improved through ROI.

## 1.5 IUA Series Camera Specifications (Moderate sensor size, general or special wavelength)

Model Number	Image Sensor	Pixel Size(μm)	GSensitivity/Dark Signal	FPS/Resolution	Binning	Exposure Time
SCM287-M-TR	0.4M/IMX287LLR(M,GS) 1/2.9"(4.97x3.73)	6.9x6.9	7320mv with 1/30s 0.76mv with 1/30s	101.5fps@720x540	1x1	6us~15s
SCM426-M-TR	0.5M/IMX426LLJ(M,GS) 1/1.7"(7.2x5.58)	9.0x9.0	8100mv with 1/30s 0.3mv with 1/30s	79.8fps@800x620	1x1	6us~15s
SCM423-C-TR	0.5M/IMX433LLJ(M,GS) 1/1.7"(7.2x5.58)	9.0x9.0	8100mv with 1/30s 0.3mv with 1/30s	79.8fps@800x620	1x1	6us~15s
SCM273-M-TR	1.5M/IMX273LLR(C,GS) 1/2.9"(4.97x3.73)	3.45x3.45	1830mv with 1/30s 0.15mv with 1/30s	235.5fps@1440x1080 523fps@720x540	1x1 1x1	15us~15s
SCM273-C-TR	1.5M/IMX273LQR(C,GS) 1/2.9"(4.97x3.73)	3.45x3.45	1146mv with 1/30s 0.15mv with 1/30s	235.5fps@1440x1080 523fps@720x540	1x1 1x1	15us~15s
SCM432-M-TR	1.7M/IMX432LLJ(M,GS) 1.1"(14.4x9.9)	9.0x9.0	8100mv with 1/30s 0.3mv with 1/30s	98.6fps@1600x1100	1x1	6us~15s
SCM432-C-TR	1.7M/IMX432LQJ(C,GS) 1.1"(14.4x9.9)	9.0x9.0	4910mv with 1/30s 0.3mv with 1/30s	98.6fps@1600x1100	1x1	6us~15s
SCM425-M-TR	1.7M/IMX425LLJ(M,GS) 1.1"(14.4x9.9)	9.0x9.0	8100mv with 1/30s 0.3mv with 1/30s	210fps@1600x1100	1x1	6us~15s
SCM425-C-TR	1.7M/IMX425LQJ(C,GS) 1.1"(14.4x9.9)	9.0x9.0	4910mv with 1/30s 0.3mv with 1/30s	210fps@1600x1100	1x1	6us~15s
SCM174-M-TR	2.3M/IMX174LLJ(M,GS) 1/1.2"(11.25x7.03)	5.86x5.86	1650mv with 1/30s 0.15mv with 1/30s	164.5fps@1920x1200	1x1	15us~15s
SCM174-C-TR	2.3M/IMX174LQJ(C,GS) 1/1.2"(11.25x7.03)	5.86x5.86	1016mv with 1/30s 0.15mv with 1/30s	164.5fps@1920x1200	1x1	15us~15s
SCM249-M-TR	2.3M/IMX249LLJ(M,GS) 1/1.2"(11.25x7.03)	5.86x5.86	1650mv with 1/30s 0.15mv with 1/30s	30fps@1920x1200	1x1	42us~15s
SCM249-C-TR	2.3M/IMX249LQJ(C,GS) 1/1.2"(11.25x7.03)	5.86x5.86	1016mv with 1/30s 0.15mv with 1/30s	30fps@1920x1200	1x1	42us~15s
SCM421-M-TR	2.8M/IMX421LLJ(M,GS) 2/3"(8.71x6.59)	4.5x4.5	3354mv with 1/30s 0.15mv with 1/30s	121fps@1936x1464 425fps@968x732	1x1 1x1	6us~15s
SCM421-C-TR	2.8M/IMX421LQJ(C,GS) 2/3"(8.71x6.59)	4.5x4.5	2058mv with 1/30s 0.15mv with 1/30s	121fps@1936x1464 425fps@968x732	1x1 1x1	6us~15s
SCM264-M-TR	5.0M/IMX264LLR(M,GS) 2/3"(8.45x7.07)	3.45x3.45	1830mv with 1/30s 0.15mv with 1/30s	35.6fps@2448x2048 87.6fps@1224x1024	1x1 1x1	15us~15s
SCM264-C-TR	5.0M/IMX264LQR(C,GS) 2/3"(8.45x7.07)	3.45x3.45	1146mv with 1/30s 0.15mv with 1/30s	35.6fps@2448x2048 87.6fps@1224x1024	1x1 1x1	15us~15s
SCM547-M-TR	5.1M/IMX547-AAMJ-C(M,GS) 1/1.8"(6.71x5.61)	2.74x2.74	2252mv with 1/30s 0.15mv with 1/30s	63fps@2448x2048 208.4fps@1224x1024	1x1 2x2	30us~15s
SCM547-C-TR	5.1M/IMX547-AAQJ-C(C,GS) 1/1.8"(6.71x5.61)	2.74x2.74	1337mv with 1/30s 0.15mv with 1/30s	63fps@2448x2048 159fps@1224x1024	1x1 2x2	30us~15s
SCM178-M-TR	6.3M/IMX178LLJ(M,RS) 1/1.8"(7.37x4.92)	2.4x2.4	760mv with 1/30s 0.15mv with 1/30s	59.9fps@3072x2048 59.9fps@1536x1024	1x1 2x2	17us~15s
SCM178-C-TR	6.3M/IMX178LQJ(C,RS) 1/1.8"(7.37x4.92)	2.4x2.4	425mv with 1/30s 0.15mv with 1/30s	59.8fps@3072x2048 59.5fps@1536x1024	1x1 2x2	17us~15s
SCM428-M-TR	7.1M/IMX428LLJ(M,GS) 1.1"(14.4x9.9)	4.5x4.5	3354mv with 1/30s 0.15mv with 1/30s	51.3fps@3200x2200 133.8fps@1584x1100	1x1 1x1	6us~15s
SCM428-C-TR	7.1M/IMX428LQJ(C,GS) 1.1"(14.4x9.9)	4.5x4.5	2058mv with 1/30s 0.15mv with 1/30s	51.4fps@3200x2200 133.8fps@1584x1100	1x1 1x1	6us~15s
SCM485-C-TR	8.3M/IMX485LQJ-C(C,RS) 1/1.2"(11.14x6.26)	2.9x2.9	2188mv with 1/30s 0.15mv with 1/30s	45fps@3840x2160 70fps@1920x1080	1x1 1x1	30us~15s
SCM585-M-TR 20230119	8.3M/IMX585-AAMJ1-C(M,RS) 1/1.2"(11.14x6.26)	2.9x2.9	9560mv with 1/30s 0.13mv with 1/30s	45fps@3840x2160 70fps@1920x1080	1x1 1x1	30us~15s
SCM585-C-TR	8.3M/IMX585-AAQJ1-C(C,RS) 1/1.2"(11.14x6.26)	2.9x2.9	5970mv with 1/30s 0.13mv with 1/30s	45fps@3840x2160 70fps@1920x1080	1x1 1x1	30us~15s
SCM687-M-TR 20231207	8.3M/IMX678-AAMR1-C(M,GS) 1/1.8"(7.68x4.32)	2.0x2.0	11288mv with 1/30s 0.15mv with 1/30s	45fps@3840x2160 70fps@1920x1080	1x1 1x1	30us~15s
SCM676-C-TR 20231019	12M/IMX676-AACR1-C(C,GS) 1/1.6"(7.07x7.07)	2.0x2.0	3637mv 0.15mv with 1/30s	27@3536x3536 60@1768x1768	1x1 2x2	30us~15s
SCM545-M-TR	12.3M/IMX545-AAMJ-C(M,GS) 1/1.1"(11.22x8.22)	2.74x2.74	2252mv with 1/30s 0.15mv with 1/30s	28.2fps@4096x3000 100.9fps@2048x1500 100.9fps@1024x750	1x1 2x2 4x4	30us~15s
SCM545-C-TR	12.3M/IMX545-AAQJ-C(C,GS) 1/1.1"(11.22x8.22)	2.74x2.74	1337mv with 1/30s 0.15mv with 1/30s	28.2fps@4096x3000 100.9fps@2048x1500 100.9fps@1024x750	1x1 2x2 4x4	30us~15s
SCM304-M-TR 20230712	12.3M/IMX304LLR-C(M,GS) 1.1"(14.13x10.35)	3.45x3.45	1830mv with 1/30s 0.15mv with 1/30s	23.4fps@4096x3000 46.3fps@2048x1500 46.3fps@1024x750	1x1 2x2 4x4	30us~15s
SCM304-C-TR 20230712	12.3M/IMX304LQR-C(C,GS) 1.1"(14.13x10.35)	3.45x3.45	1146mv with 1/30s 0.15mv with 1/30s	23.4fps@4096x3000 46.3fps@2048x1500 46.3fps@1024x750	1x1 2x2 4x4	30us~15s

<a href="#">SCM183-M-TR</a>	20.0M/IMX183CLK(M,RS) 1“ (13.06x8.84)	2.4x2.4	777mv with 1/30s 0.2mv with 1/30s	19.0fps@5440×3684 49.9fps@2736×1824 59.5fps@1824×1216	1x1 2x2 3x3	53us~15s
<a href="#">SCM183-C-TR</a>	20.0M/IMX183CQK(C,RS) 1“ (13.06x8.84)	2.4x2.4	462mv with 1/30s 0.2mv with 1/30s	19.0fps@5440×3684 48.8fps@2736×1824 59.4fps@1824×1216	1x1 2x2 3x3	53us~15s

<b>SCM541-M-TR</b>	20.4M/IMX541-AAMJ-C(M,GS) 1.1“(12.32x12.32)	2.74x2.74	2649mv with 1/30s 0.15mv with 1/30s	17.5fps@4496×4496 64.4fps@2240×2240 64.4fps@1120×1120	1x1 2x2 4x4	30us~15s
<b>SCM541-C-TR</b>	20.4M/IMX541-AAQJ-C(C,GS) 1.1“(12.32x12.32)	2.74x2.74	1574mv with 1/30s 0.15mv with 1/30s	17.5fps@4496×4496 64.4fps@2240×2240 64.4fps@1120×1120	1x1 2x2 4x4	30us~15s
<b>SCM540-M-TR</b>	24.5M/IMX540-AAMJ-C(M,GS) 1.2“(14.58x12.60)	2.74x2.74	2649mv with 1/30s 0.15mv with 1/30s	14.7fps@5320×4600 54.3fps@2660×2300	1x1 2x2 4x4	30us~15s
<b>SCM540-C-TR</b>	24.5M/IMX540-AAQJ-C(C,GS) 1.2“(14.58x12.60)	2.74x2.74	1574mv with 1/30s 0.15mv with 1/30s	14.7fps@5320×4600 54.4fps@2660×2300	1x1 2x2 4x4	30us~15s
<b>SCM0505-C-TR</b>	25M/GMAX0505(M, GS) 1.1“(12.8x12.8)	2.5x2.5	QE@500nm: 65.8% 2.4e-/pixel/s	13fps@5120×5120 27fps@2560×2560 54fps@1280×1280	1x1 2x2 4x4	150us~15s
<b>SCM0505-C-TR</b>	25M/GMAX0505(C, GS) 1.1“(12.8x12.8)	2.5x2.5	QE@520nm: 58.0% 2.4e-/pixel/s	13fps@5120×5120 27fps@2560×2560 54fps@1280×1280	1x1 2x2 4x4	150us~15s
<b>SCM492-M-TR</b>	45M/IMX492LLJ-C (M) 4/3“(19.11x13.00)	2.315x2.315	176mv with 1/30s 0.03mv with 1/30s	8.1@8176x5616 30.0@4080x2808 8.1@7408x5556 33.0@3696x2778 10.4@8176x4320 34.7@4096x2160 62.5@2048x1080 86.5@1360x720	1x1 2x2 1x1 2x2 1x1 2x2 3x3 4x4	100us~15s

**IUA-Specialwavelength (UV, NIR)**

<b>SCM-462-CNIR-TR</b>	2.1M/IMX462LQR(C,RS,NIR) 1/2.8“(5.57x3.13)	2.9x2.9	2376mv with 1/30s 0.15mv with 1/30s	120.3fps@1920x1080	1x1	11us~15s
<b>SCM464-CNIR-TR</b>	4.1M/IMX464LQR(C,RS,NIR) 1/1.8“(7.8x4.41)	2.9x2.9	2376mv with 1/30s 0.15mv with 1/30s	90fps@2688 x 1520	1x1	11us~15s
<b>SCA1605-UV-TR (GPixel UV)</b>	0.5M/GLUX1605BSI(M,UV,RS) 1“(12.8x9.6)	16x16	$6.4 \times 10^8$ (e- /((W/m <sup>2</sup> ).s)) QE91%@550nm 50(e-/s/pix)	60fps@800×600 60fps@400×300	1x1 2x2	27us~60s
<b>SCA9701-UV-TR (GPixel UV)</b>	1.3M/GLUX9701BSI(M,UV,RS) 1“(12.49x9.99)	9.76x9.76	$2.57 \times 10^8$ (e- /((W/m <sup>2</sup> ).s)) QE89%@610nm 40(e-/s/pix)	30fps@1280×1024 30fps@640×512	1x1 2x2	63us~60s
<b>SCA2020-ME (GPixel NIR)</b>	4.2M/GSENSE2020e(M,NIR,RS) 1.2“(13.31x13.31)	6.5x6.5	$8.1 \times 10^7$ (e- /((W/m <sup>2</sup> ).s)) QE73%@595nm 13(e-/s/pix)	45fps@2048×2048 45fps@1024×1024	1x1 2x2	21us~60s
<b>SCA2020-UV-TR (GPixel UV)</b>	4.2M/GSENSE2020BSI(M,UV,RS) 1.2“(13.31x13.31)	6.5x6.5	$1.1 \times 10^8$ (e- /((W/m <sup>2</sup> ).s)) QE93.7%@550nm 80(e-/s/pix)	32fps@2048×2048 32fps@1024×1024	1x1 2x2	21us~60s
<b>SCA400-UV-TR (GPixel UV)</b>	4.2M/GSENSE400BSI(M,UV,RS) 2.0“(22.53x22.53)	11.0x11.0	$3.25 \times 10^8$ (e- /((W/m <sup>2</sup> ).s)) QE95.3%@560nm 345(e-/s/pix)	37fps@2048×2048 37fps@1024×1024	1x1 2x2	21us~60s
<b>SCM487-UV-TR(GS-UV)</b>	8.0M/IMX487-AAMJ(M,UV,GS) 2/3“(7.78x7.78)	2.74x2.74	145mv with 1/30s 0.15mv with 1/30s	45fps@2840×2840 198fps@1420×1420	1x1 2x2	30us~15s

M: Monochromatic; C: Color; UV: Ultra Violet; RS: Rolling Shutter; GS: Global Shutter; NIR: NIR Up.

## 1.6 IUC Series Camera Specifications (APS or full frame)

Model Number	Image Sensor	Pixel Size(μm)	GSensitivity/Dark Signal	FPS/Resolution	Binning	Exposure Time
SCC410-C-TR 20231019	24.0M/IMX410CQK-C(C, RS) 2.7“(36.02x24.00, Full Frame)	5.94x5.94	572.8mv with 1/30s 0.037mv with 1/30s	15.3@6064x4040(14bit) 41@3024x2012 114@2016x1342	1x1 2x2 3x3	150us~15s
SCC571-M-TR	26.0M/IMX571BLR(M, RS) 1.8“(23.48x15.67, APS-C)	3.76x3.76	870.9mv with 1/30s 0.07mv with 1/30s	14fps@6224x4168(16bit) 37fps@3104x2084 110fps@2064x1388	1x1 2x2 3x3	150us~15s
SCC571-C-TR	26.0M/IMX571BQR(C, RS) 1.8“(23.48x15.67, APS-C)	3.76x3.76	484.5mv with 1/30s 0.07mv with 1/30s	14fps@6224x4168(16bit) 37fps@3104x2084 110fps@2064x1388	1x1 2x2 3x3	150us~15s
SCC342-M-TR	31.0M/IMX342LLA(M, GS) 1.8“(22.3x16.74, APS-C)	3.45x3.45	1830mv with 1/30s 0.15mv with 1/30s	12.0fps@6464x4852 45.9fps@3216x2426	1x1 2x2	31us~15s
SCC342-C-TR	31.0M/IMX342LQA(C, GS) 1.8“(22.3x16.74, APS-C)	3.45x3.45	1146mv with 1/30s 0.15mv with 1/30s	12.0fps@6464x4852 45.9fps@3216x2426	1x1 1x1	31us~15s
SCC455-M-TR	60.0M/IMX455ALK (M, RS) 2.7“(35.96x23.99, Full Frame)	3.76x3.76	870.9mv with 1/30s 0.04mv with 1/30s	6.1fps@9568x6380(16bit) 24.6fps@4784x3190 55.8fps@3184x2124 191.0fps@1040x706	1x1 2x2 3x3 9x9	150us~15s
SCC455-C-TR	60.0M/IMX455AQK (C, RS) 2.7“(35.96x23.99, Full Frame)	3.76x3.76	484.5mv with 1/30s 0.07mv with 1/30s	6.1fps@9568x6380(16bit) 24.6fps@4784x3190 55.8fps@3184x2124 191.0fps@1040x706	1x1 2x2 3x3 9x9	150us~15s

M: Monochromatic; C: Color; RS: Rolling Shutter; GS: Global Shutter.

## 1.7 IUD Series Camera Specifications (NIR)

Model Number	Image Sensor	Pixel Size(μm)	GSensitivity/Dark Signal	FPS/Resolution	Binning	Exposure Time
SCD16000-NIR-TR 20240313	16.0M/PYTHON 16K (M, GS) (18.43x18.43)	4.5x4.5	TBD	22.5@4096x4096	1x1	1us~60s
SCD25000-NIR-TR 20240228	25.0M/PYTHON 25K (M, GS) 2.04“(23.04x23.04)	4.5x4.5	<1/5000 3.9 e <sup>-</sup> /s@ 20°C	14.8@5120x5120 14.8@2560x2560 14.8@1664x1664	1x1 2x2 3x3	1us~60s

M: Monochromatic; C: Color; RS: Rolling Shutter; GS: Global Shutter.

## 2 SWIR Sony Series Camera Specification

### 2.1 Application of SWIR Camera

SWIR series are TE-Cooling USB3.0 / GigE / MIPI(developing) / CameraLink(developing) InGaAs SWIR cameras, which adopts Sony IMX990 / IMX991 /IMX992 Short-Wavelength Infrared (SWIR) Image Sensor. It is suitable to capture images in both visible range and SWIR range, covering 400nm to 1800nm. With smaller pixel size of 5um, imaging shows higher precision for quantitative researches.

Electronic board inspection, solar cell inspection, semiconductor inspection, transmission observation, produce inspection, identifying and sorting, water visualization, temperature observation, surveillance, anti-counterfeiting Short wave infrared high-end night vision security applications are also the best choice.



## 2.2 MAXCAM-990TE-TR

Table 2-1 MAXCAM-990TE-TR camera specifications

Parameter	Model	MAXCAM-990TE-TR (SWIR1300KMA)
		1.3MPixels 1/2"CMOS USB3.0 industrial camera
	Camera	
Sensor model	Sony IMX990-AABA-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/2"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 200fps@1280 x 1024、392fps@640 x 512 12 Bit: 108fps@1280 x 1024、209fps@640 x 512	
Image Buffer	512MByte	
Conversion Gain	44.3e/ADU	
Dynamic range	58.7dB	
Readout Noise	211e	
Full Well	181.6ke	
SNRmax	52.6dB	
Sensitivity	121mV	
Dark current	383e/s(0°C) 510e/s(10°C) 638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	25°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0 or 12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

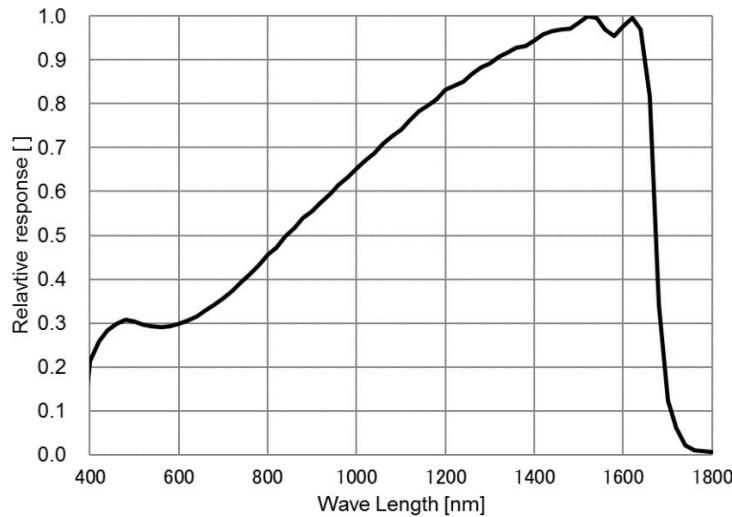


Figure 2-1 MAXCAM-990TE-TR spectral response curve

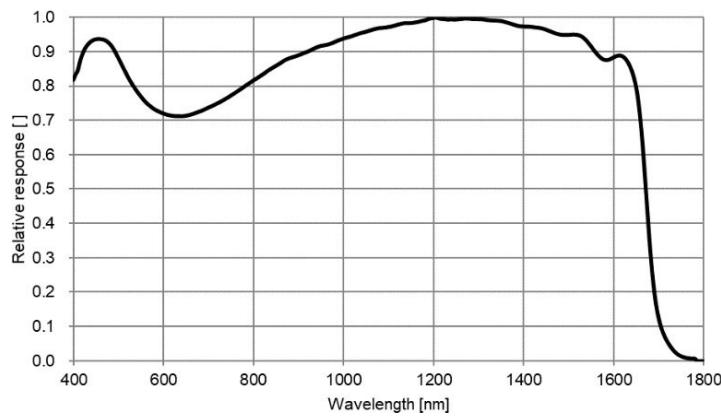


Figure 2-2 MAXCAM-990TE-TR relative quantum efficiency

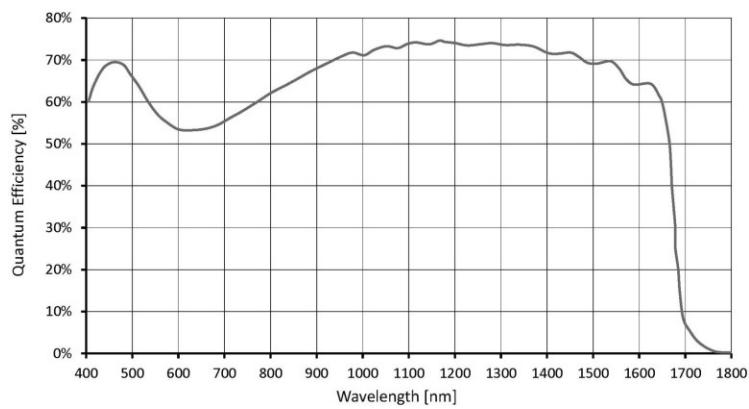


Figure 2-3 MAXCAM-990TE-TR absolute quantum efficiency

## 2.3 MAXCAM-990-TR

Table 2-2 MAXCAM-990-TR camera specifications

Parameter	Model MAXCAM-990-TR (SWIR1300KMB) 1.3M pixels 1/2" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX990-AABJ-C
Sensor Type	InGaAs
Spectral Range	400nm-1700nm
Pixel size	5.0 μm x 5.0 μm
Sensor size	1/2"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 200fps@1280 x 1024、392fps@640 x 512 12 Bit: 108fps@1280 x 1024、209fps@640 x 512
Image Buffer	512MByte
Conversion Gain	42.8e/ADU
Dynamic range	58.7dB
Readout Noise	197.6e
Full Well	175.4ke
SNRmax	52.4dB
Sensitivity	121mV
Dark current	638e/s(20°C)
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	10°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	Power with USB3.0 or 12V Power adapter
Power consumption	<2.1W(without cooling) / <25W(cooling)
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

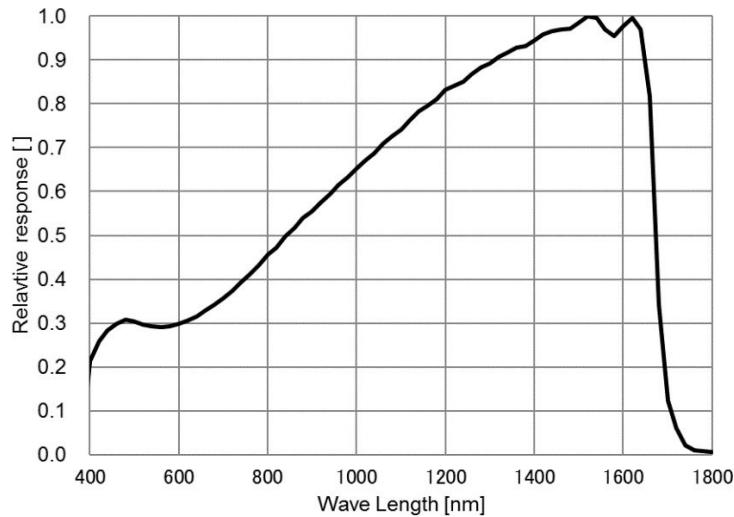


Figure 2-4 MAXCAM-990-TR spectral response curve

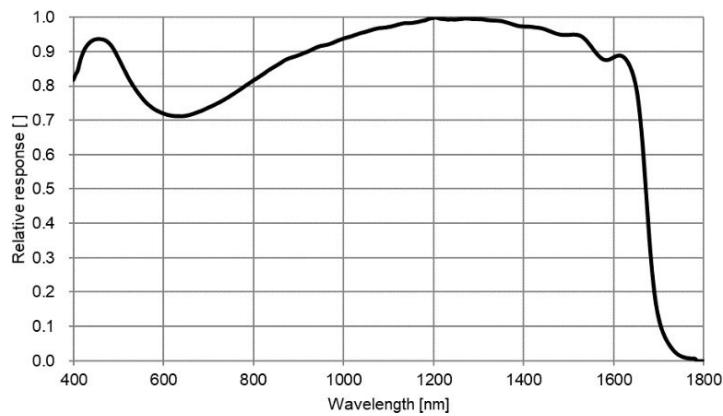


Figure 2-5 MAXCAM-990-TR relative quantum efficiency

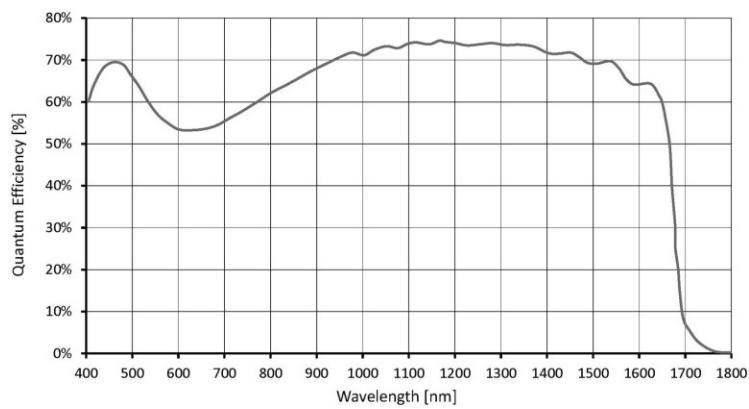


Figure 2-6 MAXCAM-990-TR absolute quantum efficiency

## 2.4 MAXCAM-991TE-TR

Table 2-3 MAXCAM-991TE-TR camera specifications

Parameter	Model MAXCAM-991TE-TR (SWIR330KMA) 0.33Mpixels 1/4"CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX991-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1700nm
Pixel size	5.0 $\mu\text{m}$ x 5.0 $\mu\text{m}$
Sensor size	1/4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 400fps@640 x 512、753fps@320 x 256 12 Bit: 212fps@640 x 512、400fps@320 x 256
Image Buffer	512MByte
Conversion Gain	42.29e/ADU
Dynamic range	59.7dB
Readout Noise	176.7e
Full Well	173.23ke
SNRmax	52.39dB
Sensitivity	121mV
Dark current	383e/s(0°C) 510e/s(10°C) 638e/s(20°C)
Gain range	1x-15x
Exposure time	15 $\mu\text{s}$ -60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	25°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	Power with USB3.0 or 12V Power adapter
Power consumption	<2.1W(without cooling) / <25W(cooling)
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

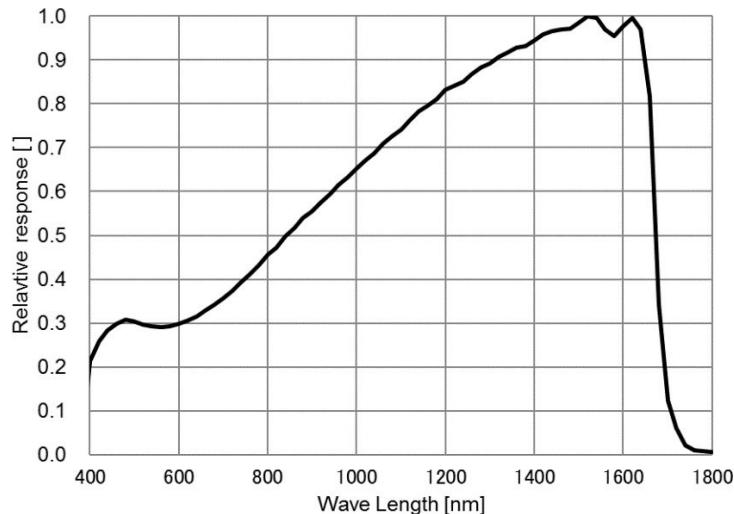


Figure 2-7 MAXCAM-991TE-TR spectral response curve

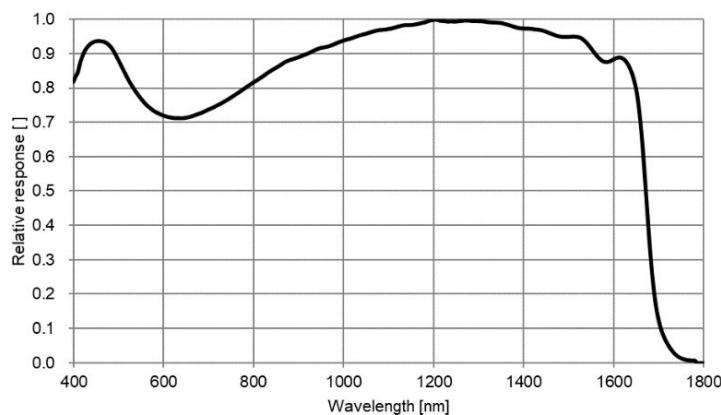


Figure 2-8 MAXCAM-991TE-TR relative quantum efficiency

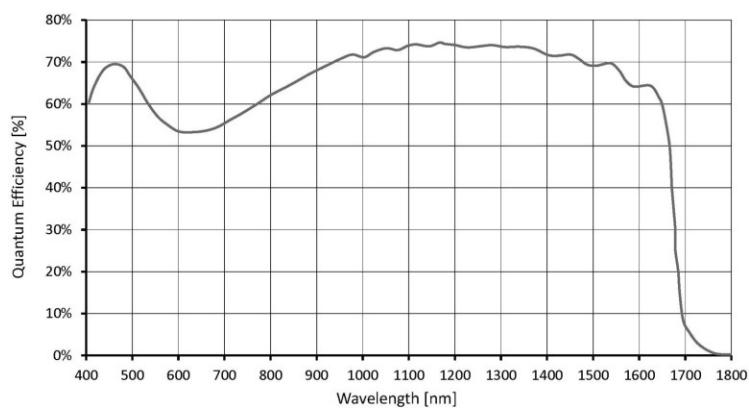


Figure 2-9 MAXCAM-991TE-TR absolute quantum efficiency

## 2.5 MAXCAM-991-TR

Table 2-4 MAXCAM-991-TR camera specifications

Parameter	Model	MAXCAM-991-TR (SWIR330KMB) 0.33M pixels 1/4" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX991-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 400fps@640 x 512、753fps@320 x 256 12 Bit: 212fps@640 x 512、400fps@320 x 256	
Image Buffer	512MByte	
Conversion Gain	43.0e/ADU	
Dynamic range	59.6dB	
Readout Noise	178.8e	
Full Well	176.2ke	
SNRmax	52.5dB	
Sensitivity	121mV	
Dark current	638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0 or 12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

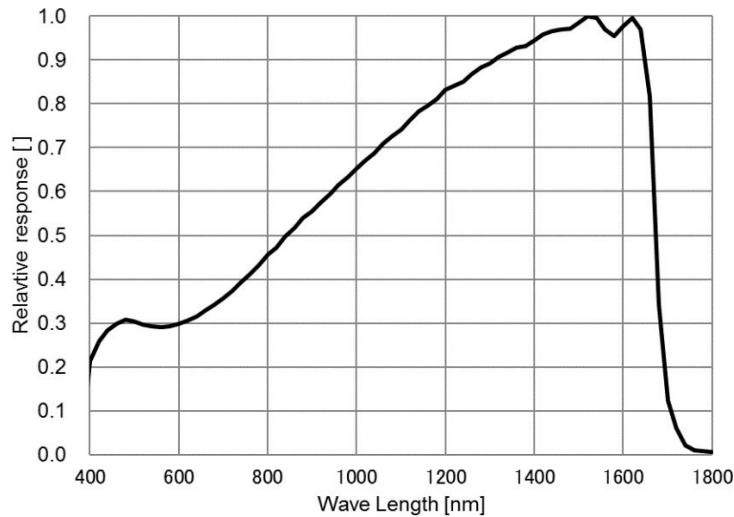


Figure 2-10 MAXCAM-991-TR spectral response curve

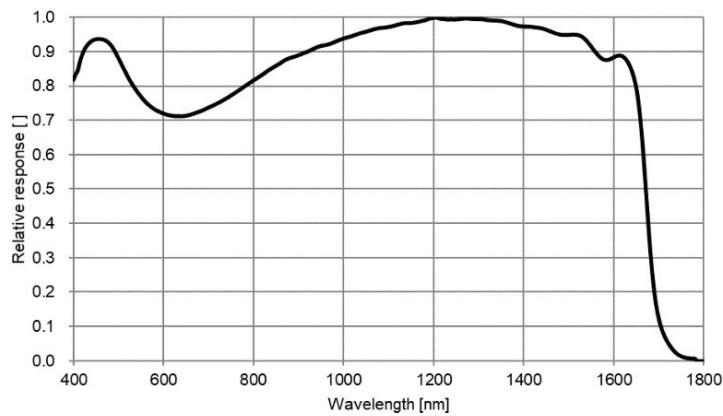


Figure 2-11 MAXCAM-991-TR relative quantum efficiency

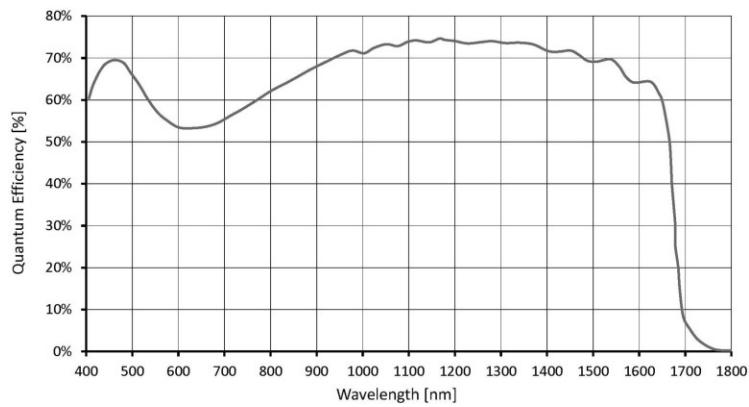


Figure 2-12 MAXCAM-991-TR absolute quantum efficiency

## 2.6 MAXCAM-992TE-TR

Table 2-5 MaxCam-992TE-TR camera specifications

Parameter	Model	MaxCam-992TE-TR (SWIR5000KMA)
		5.0Mpixels 1/1.4" CMOS USB3.0 industrial camera
<b>Camera</b>		
Sensor model	Sony IMX992-AABA-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	3.45 μm x 3.45 μm	
Sensor size	1/1.4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 61.9fps@2560x2048、135.7fps@1280x1024 12 Bit: 35.5fps@2560x2048、135.7fps@1280x1024	
Image Buffer	512MByte	
Conversion Gain	10.3e/ADU (HCG) 17.29e/ADU (LCG)	
Dynamic range	51.36dB (HCG) 51.47dB (LCG)	
Readout Noise	111.88e (HCG) 186.61e (LCG)	
Full Well	41.39ke (HCG) 69.92ke (LCG)	
SNRmax	46.17dB (HCG) 48.45dB (LCG)	
Sensitivity	TBD	
Dark current	TBD	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	25°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0 or 12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

## 2.7 MAXCAM-992-TR

Table 2-6 MaxCam-990-TR camera specifications

Parameter	Model	MaxCam-992-TR (SWIR5000KMB)
		5.0Mpixels 1/1.4" CMOS USB3.0 industrial camera
<b>Camera</b>		
Sensor model	Sony IMX992-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	3.45 μm x 3.45 μm	
Sensor size	1/1.4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 61.9fps@2560x2048、135.7fps@1280x1024 12 Bit: 35.5fps@2560x2048、135.7fps@1280x1024	
Image Buffer	512MByte	
Conversion Gain	10.3e/ADU (HCG) 17.29e/ADU (LCG)	
Dynamic range	51.36dB (HCG) 51.47dB (LCG)	
Readout Noise	111.88e (HCG) 186.61e (LCG)	
Full Well	41.39ke (HCG) 69.92ke (LCG)	
SNRmax	46.17dB (HCG) 48.45dB (LCG)	
Sensitivity	TBD	
Dark current	TBD	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0 or 12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

## 2.8 SC990-TR-UMV(20230825)

Table 2-7 SC990-TR-UMV camera specifications

Parameter	Model	SC990-TR-UMV (SWIR1300KMB-UMV) 1.3Mpixels 1/2"CMOS USB3.0 industrial camera
	Camera	
Sensor model	Sony IMX990-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/2"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 223fps@1280 x 1024、428fps@640 x 512 12 Bit: 118.7fps@1280 x 1024、227.7fps@640 x 512	
Image Buffer	512MByte	
Conversion Gain	42.8e/ADU	
Dynamic range	58.7dB	
Readout Noise	197.6e	
Full Well	175.4ke	
SNRmax	52.4dB	
Sensitivity	121mV	
Dark current	638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, one non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0	
Power consumption	<2.11W	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	33mm×33mm×38mm	
Weight	70g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

When the ambient temperature is 25.5 degrees, the camera is placed on a wooden table, and the exposure time is 1.5ms in 8bit mode.

Resolution	Overclock	Frame rate	Power consumption	Sensor temperature
1280*1024	Off	135fps	1.75W	42.3
1280*1024	On	223fps	2.11W	43.2
640*512	Off	258fps	1.51W	38.1
640*512	On	428fps	1.75W	40

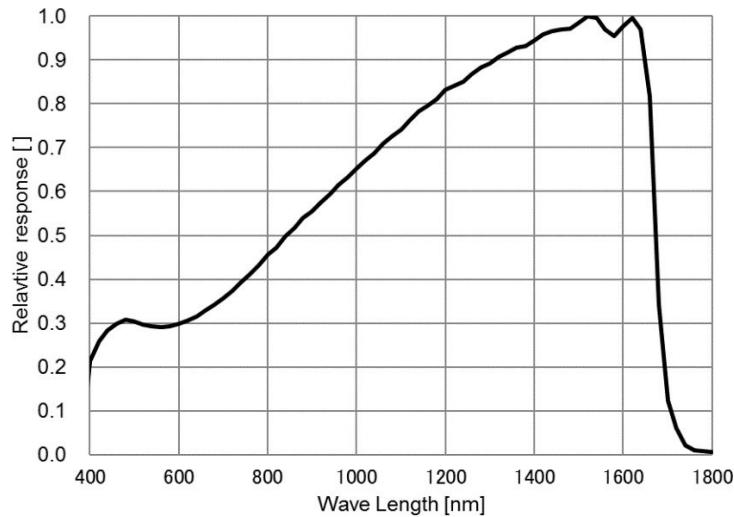


Figure 2-13 SC990-TR-UMV spectral response curve

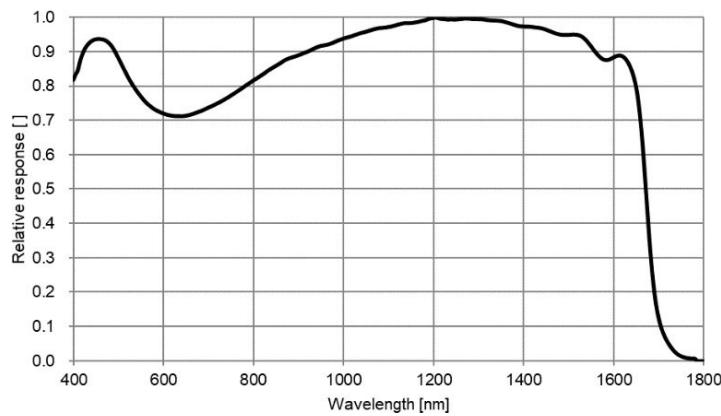


Figure 2-14 SC990-TR-UMV relative quantum efficiency

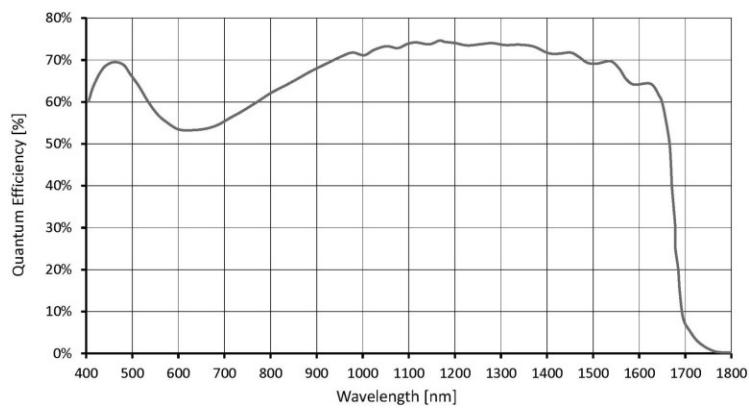


Figure 2-15 SC990-TR-UMV absolute quantum efficiency

## 2.9 SC991-TR-UMV(20230825)

Table 2-8 SC991-TR-UMV camera specifications

Parameter	Model	SC991-TR-UMV (SWIR330KMB) 0.33Mpixels 1/4" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX991-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1700nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 428.1fps@640 x 512、 807fps@320 x 256 12 Bit: 227.7fps@640 x 512、 429.3fps@320 x 256	
Image Buffer	512MByte	
Conversion Gain	43.0e/ADU	
Dynamic range	59.6dB	
Readout Noise	178.8e	
Full Well	176.2ke	
SNRmax	52.5dB	
Sensitivity	121mV	
Dark current	638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, one non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	Power with USB3.0	
Power consumption	<2.11W	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	33mm×33mm×38mm	
Weight	70g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

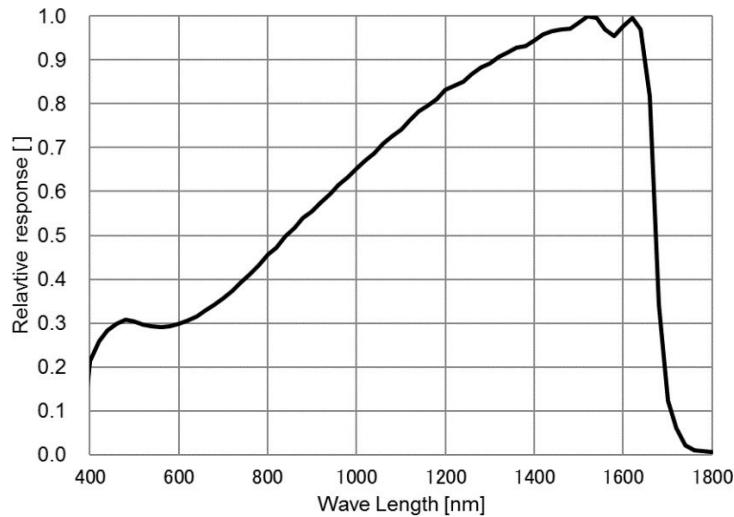


Figure 2-16 SC991-TR-UMV spectral response curve

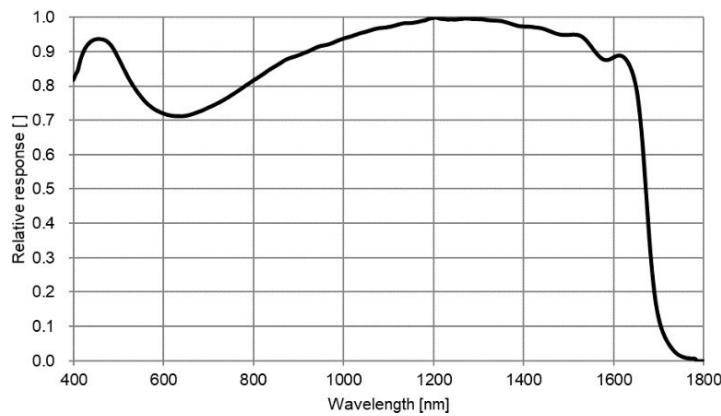


Figure 2-17 SC991-TR-UMV relative quantum efficiency

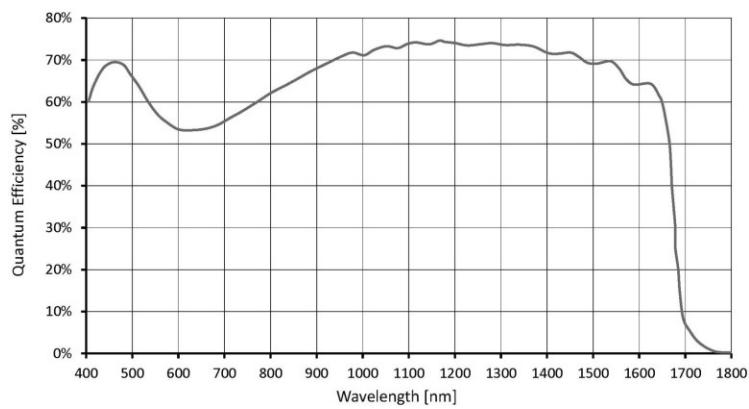


Figure 2-18 SC991-TR-UMV absolute quantum efficiency

## 2.10 SC992-UMV

Table 2-9 SC992-UMV camera specifications

Parameter \ Model	SC992-UMV (SWIR5000KMB-UMV)
	5.0Mpixels 1/1.4" CMOS USB3.0 industrial camera
Camera	
Sensor model	Sony IMX992-AABJ-C
Sensor Type	InGaAs
Spectral Range	400nm-1700nm
Pixel size	3.45 μm x 3.45 μm
Sensor size	1/1.4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 61.9fps@2560x2048、135.7fps@1280x1024 12 Bit: 35.5fps@2560x2048、135.7fps@1280x1024
Image Buffer	512MByte
Conversion Gain	TBD
Dynamic range	TBD
Readout Noise	TBD
Full Well	TBD
SNRmax	TBD
Sensitivity	TBD
Dark current	TBD
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, one non-isolated input and output
Data Format	8bit / 12bit
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
General specification	
Power supply	Power with USB3.0
Power consumption	<2.11W
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	33mm×33mm×38mm
Weight	70g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

## 2.11 MAXCAM-990TE-TR-G

Table 2-10 MAXCAM-990TE-TR-G camera specifications

Parameter \ Model	MAXCAM-990TE-TR-G (SWIR1300KMA-G) 1.31Mpixels 1/2" CMOS GigEindustrial camera
	Camera
Sensor model	Sony IMX990-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1800nm
Pixel size	5.0 μm x 5.0 μm
Sensor size	1/2"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 90fps@1280 x 1024、253fps@640 x 512 12 Bit: 45fps@1280 x 1024、135fps@640 x 512
Image Buffer	512MByte
Conversion Gain	44.3e/ADU
Dynamic range	58.7dB
Readout Noise	211e
Full Well	181.6ke
SNRmax	52.6dB
Sensitivity	121mV
Dark current	383e/s(0°C) 510e/s(10°C) 638e/s(20°C)
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	GigE
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	25°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	12V Power adapter
Power consumption	<2.1W(without cooling) / <25W(cooling)
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

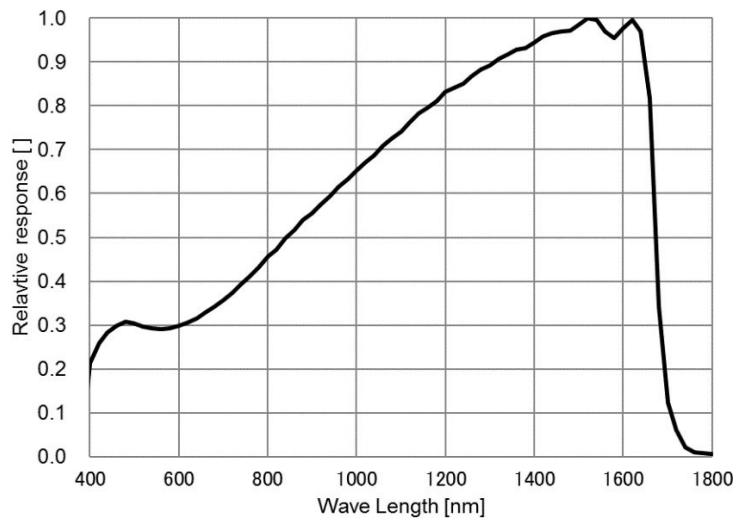


Figure 2-19 MAXCAM-990TE-TR-G spectral response curve

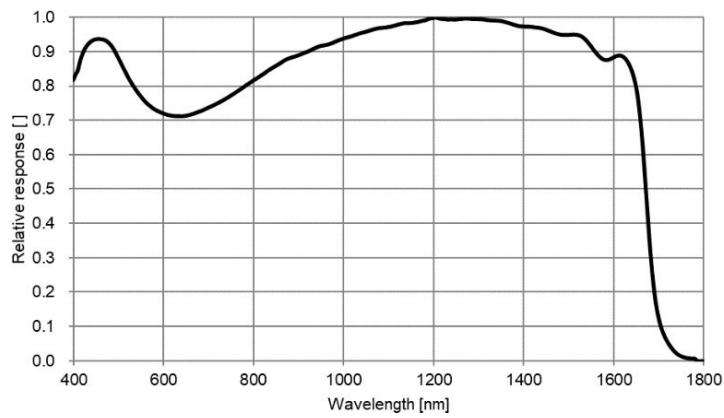


Figure 2-20 MAXCAM-990TE-TR-G relative quantum efficiency

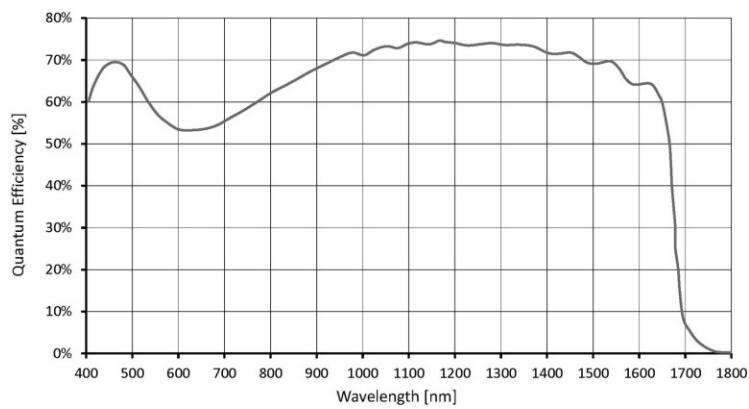


Figure 2-21 MAXCAM-990TE-TR-G absolute quantum efficiency

## 2.12 MAXCAM-990-TR-G

Table 2-11 MAXCAM-990-TR-G camera specifications

Parameter	Model	MAXCAM-990-TR-G (SWIR13000KMB-G)
		1.3Mpixels 1/2" CMOS GigEindustrial camera
<b>Camera</b>		
Sensor model	Sony IMX990-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1800nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/2"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 90fps@1280 x 1024、 253fps@640 x 512 12 Bit: 45fps@1280 x 1024、 135fps@640 x 512	
Image Buffer	512MByte	
Conversion Gain	42.8e/ADU	
Dynamic range	58.7dB	
Readout Noise	197.6e	
Full Well	175.4ke	
SNRmax	52.4dB	
Sensitivity	121mV	
Dark current	638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	GigE	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

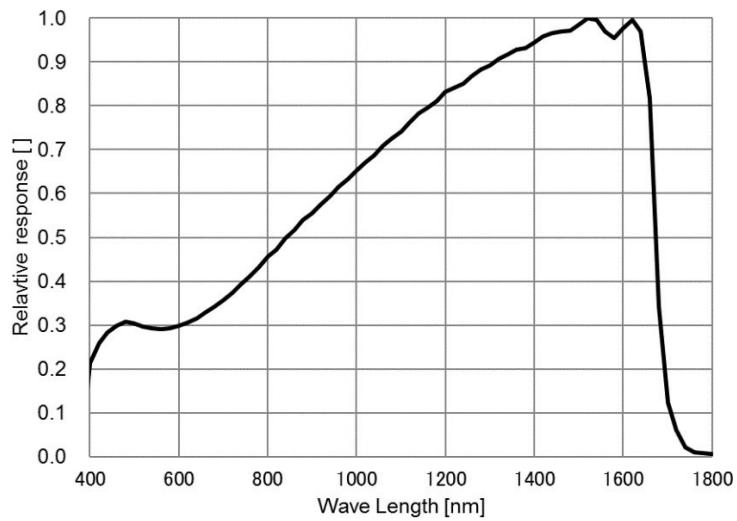


Figure 2-22 MAXCAM-990-TR-G spectral response curve

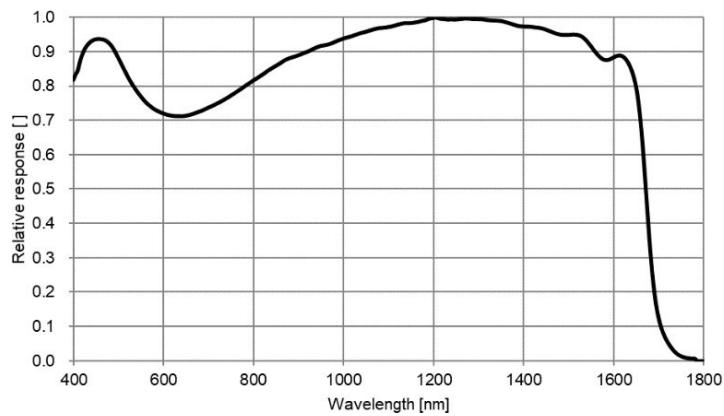


Figure 2-23 MAXCAM-990-TR-G relative quantum efficiency

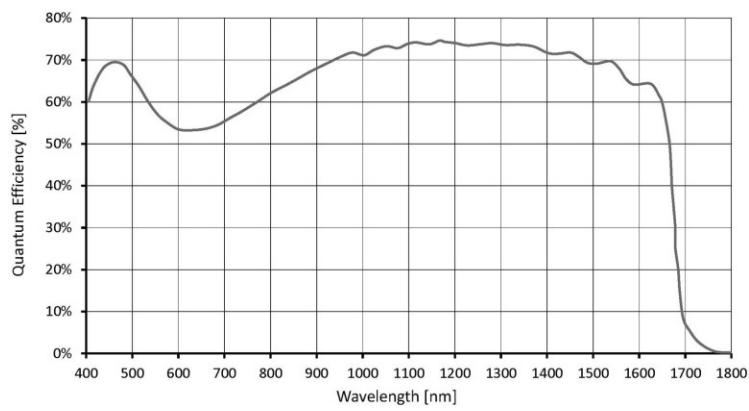


Figure 2-24 MAXCAM-990-TR-G absolute quantum efficiency

## 2.13 MAXCAM-991TE-TR-G

Table 2-12 MAXCAM-991TE-TR-G camera specifications

Parameter \ Model	MAXCAM-991TE-TR-G (SWIR330KMA-G) 0.33Mpixels 1/4" CMOS GigEindustrial camera
	Camera
Sensor model	Sony IMX991-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1800nm
Pixel size	5.0 μm x 5.0 μm
Sensor size	1/4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 257.8fps@640 x 512、486.1fps@320 x 256 12 Bit: 137.1fps@640 x 512、258.6fps@320 x 256
Image Buffer	512MByte
Conversion Gain	42.29e/ADU
Dynamic range	59.7dB
Readout Noise	176.7e
Full Well	173.23ke
SNRmax	52.39dB
Sensitivity	121mV
Dark current	383e/s(0°C) 510e/s(10°C) 638e/s(20°C)
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	GigE
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	25°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	12V Power adapter
Power consumption	<2.1W(without cooling) / <25W(cooling)
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

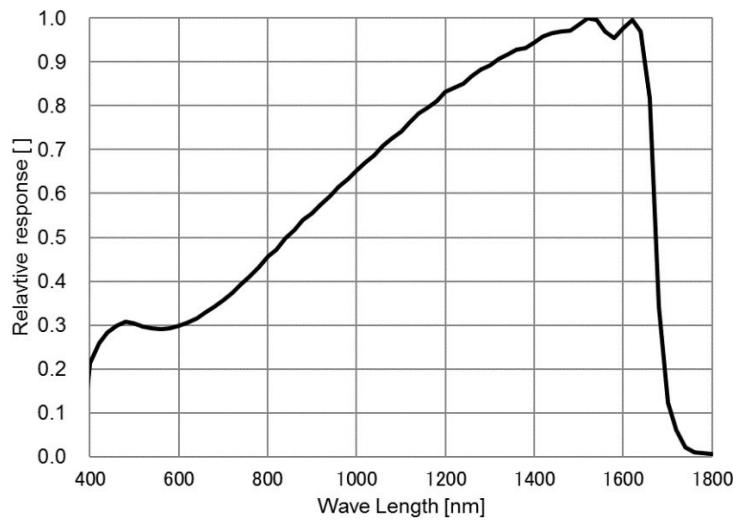


Figure 2-25 MAXCAM-991TE-TR-G spectral response curve

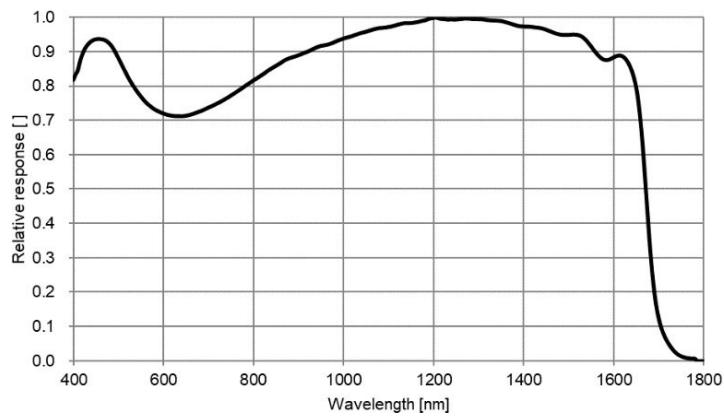


Figure 2-26 MAXCAM-991TE-TR-G relative quantum efficiency

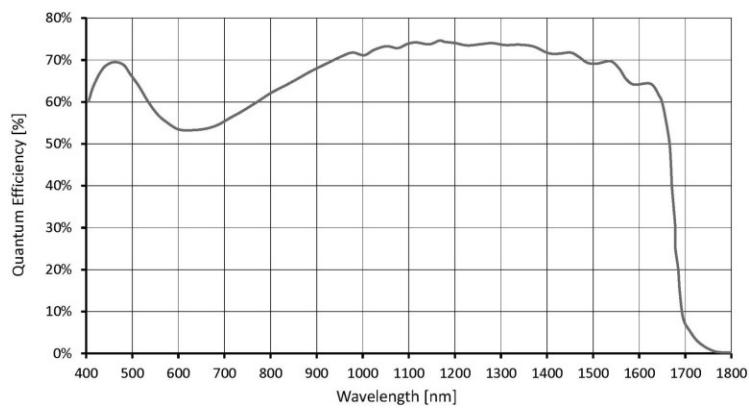


Figure 2-27 MAXCAM-991TE-TR-G absolute quantum efficiency

## 2.14 MAXCAM-991-TR-G

Table 2-13 MAXCAM-991-TR-G camera specifications

Parameter	Model	MAXCAM-991-TR-G (SWIR330KMB-G)
		0.33Mpixels 1/4"CMOS GigEindustrial camera
<b>Camera</b>		
Sensor model	Sony IMX991-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1800nm	
Pixel size	5.0 μm x 5.0 μm	
Sensor size	1/4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 257.8fps@640 x 512、 486.1fps@320 x 256 12 Bit: 137.1fps@640 x 512、 258.6fps@320 x 256	
Image Buffer	512MByte	
Conversion Gain	43.0e/ADU	
Dynamic range	59.6dB	
Readout Noise	178.8e	
Full Well	176.2ke	
SNRmax	52.5dB	
Sensitivity	121mV	
Dark current	638e/s(20°C)	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	GigE	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	12V Power adapter	
Power consumption	<2.1W(without cooling) / <25W(cooling)	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

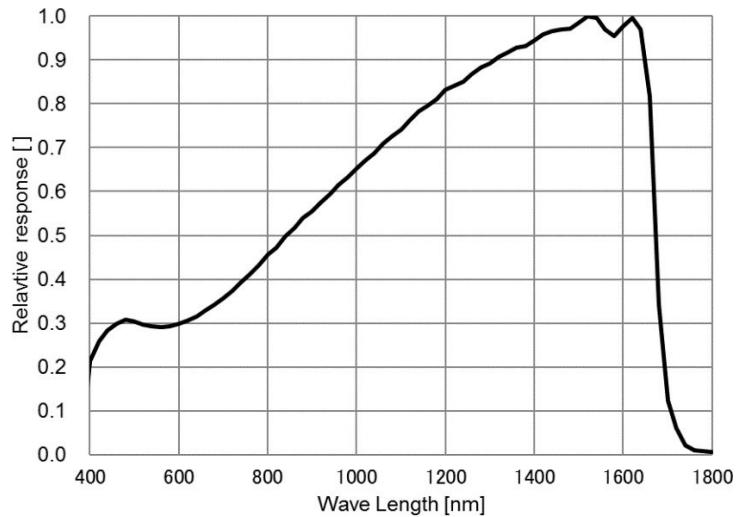


Figure 2-28 MAXCAM-991-TR-G spectral response curve

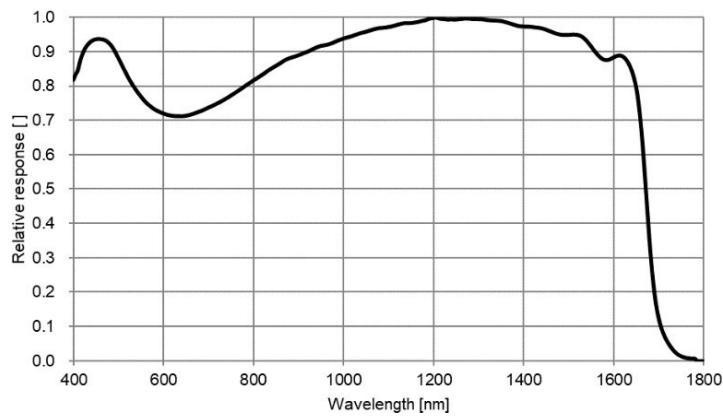


Figure 2-29 MAXCAM-991-TR-G relative quantum efficiency

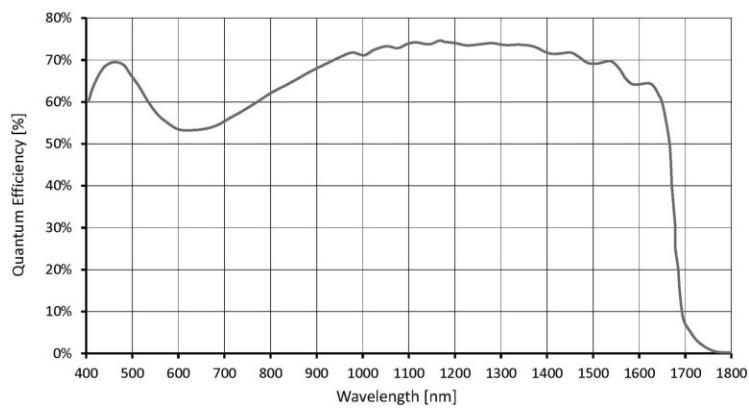


Figure 2-30 MAXCAM-991-TR-G absolute quantum efficiency

## 2.15 MAXCAM-992TE-TR-G

Table 2-14 MAXCAM-992TE-TR-G camera specifications

Parameter \ Model	MAXCAM-992TE-TR-G (SWIR5000KMA-G) 5.0M pixels 1/1.4" CMOS GigE industrial camera
	Camera
Sensor model	Sony IMX992-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1800nm
Pixel size	3.45 μm x 3.45 μm
Sensor size	1/1.4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 22fps@2560x2048、88fps@1280x1024 12 Bit: 11fps@2560x2048、44fps@1280x1024
Image Buffer	512MByte
Conversion Gain	TBD
Dynamic range	TBD
Readout Noise	TBD
Full Well	TBD
SNRmax	TBD
Sensitivity	TBD
Dark current	TBD
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	GigE
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	25°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	12V Power adapter
Power consumption	TBD
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

## 2.16 MAXCAM-992-TR-G

Table 2-15 MAXCAM-992-TR-G camera specifications

Parameter	Model	MAXCAM-992-TR-G (SWIR5000KMB-G) 5.0Mpixels 1/1.4" CMOS GigEindustrial camera
	Camera	
Sensor model	Sony IMX990-AABJ-C	
Sensor Type	InGaAs	
Spectral Range	400nm-1800nm	
Pixel size	3.45 μm x 3.45 μm	
Sensor size	1/1.4"	
ADC	12 Bit / 8 Bit	
Frame rate	8 Bit: 22fps@2560x2048、88fps@1280x1024 12 Bit: 11fps@2560x2048、44fps@1280x1024	
Image Buffer	512MByte	
Conversion Gain	TBD	
Dynamic range	TBD	
Readout Noise	TBD	
Full Well	TBD	
SNRmax	TBD	
Sensitivity	TBD	
Dark current	TBD	
Gain range	1x-15x	
Exposure time	15μs-60sec	
Shutter	Global shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	GigE	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
Cooling performance	10°C below ambient temperature	
Optical filter	400-1800nm(default); 1030-1800nm(optional)	
CRA	2.35 Deg	
<b>General specification</b>		
Power supply	12V Power adapter	
Power consumption	TBD	
Temperature	Working temperature -20~60°C, storage temperature -40~85°C	
Humidity	20%-80%, no condensation	
Size	80mm×80mm×45.5mm	
Weight	<390g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

## 2.17 MAXCAM-992TE-TR-10G

Table 2-16 MAXCAM-992TE-TR-10G camera specifications

Parameter \ Model	MAXCAM-992TE-TR-10G (SWIR5000KMA-10G)
	5.0M pixels 1/1.4" CMOS 10GigE industrial camera
Camera	
Sensor model	Sony IMX992-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1800nm
Pixel size	3.45 μm x 3.45 μm
Sensor size	1/1.4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 131.9fps@2560x2048 12 Bit: 70.9fps@2560x2048
Image Buffer	512MByte
Conversion Gain	TBD
Dynamic range	TBD
Readout Noise	TBD
Full Well	TBD
SNRmax	TBD
Sensitivity	TBD
Dark current	TBD
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	10GigE
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	25°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
General specification	
Power supply	12V Power adapter
Power consumption	TBD
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

## 2.18 MAXCAM-992-TR-10G

Table 2-17 MAXCAM-992-TR-10G camera specifications

Parameter \ Model	MAXCAM-992-TR-10G (SWIR5000KMB-10G) 5.0M pixels 1/1.4" CMOS 10GigE industrial camera
<b>Camera</b>	
Sensor model	Sony IMX992-AABA-C
Sensor Type	InGaAs
Spectral Range	400nm-1800nm
Pixel size	3.45 μm x 3.45 μm
Sensor size	1/1.4"
ADC	12 Bit / 8 Bit
Frame rate	8 Bit: 131.9fps@2560x2048 12 Bit: 70.9fps@2560x2048
Image Buffer	512MByte
Conversion Gain	TBD
Dynamic range	TBD
Readout Noise	TBD
Full Well	TBD
SNRmax	TBD
Sensitivity	TBD
Dark current	TBD
Gain range	1x-15x
Exposure time	15μs-60sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	10GigE
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
Cooling performance	10°C below ambient temperature
Optical filter	400-1800nm(default); 1030-1800nm(optional)
CRA	2.35 Deg
<b>General specification</b>	
Power supply	12V Power adapter
Power consumption	TBD
Temperature	Working temperature -20~60°C, storage temperature -40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

## 2.19 Packing List of SWIR Series Camera

### 2.19.1 USB Port Camera



Standard Package	
B	3-A safety equipment case: L:28cm W:23cm H:15.5cm (1pcs, 2.8Kg/ box); Carton size: L:28.2cm W:25.2cm H:16.7cm(TBD)
C	One SWIR /SWIR-UMV series USB3.0 camera(C-mount)
D	D1, D2, D3 and D4 are national standard, American Standard, European standard, and British standard power lines respectively
E	Power adapter: input: AC 100~240V 50Hz/60Hz, output: DC12 V 3A
F	High-Speed USB3.0 A male to B male gold-plated connectors cable /1.5m
G	One external trigger control cable
H	USB flash driver (Driver & utilities software)

## 2.19.2 GigE Port Camera



Standard Package	
A	External box for B(not shown in this figure) Carton size: L:28.2cm W:25.2cm H:16.7cm
B	3-A safety equipment case: L:28cm W:23cm H:15.5cm (1pes, 2.8Kg/ box)
C	One SWIR series GigE camera
D	Power cord. National standard, American standard, European standard, British standard power cord ( D1, D2, D3, D4 ) for choosing
E	Power adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 3A
F	One external trigger control cable
G	GigE cable: G1:3m G2:5m G3:10m(G4: 50m not shown in this figure)
H	USB flash disk (with driver and application software in it) OPTIONAL

### 3 MAXCAM-331 Series Camera Specification

#### 3.1 Application of MAXCAM-331 Camera

MAXCAM-331 Short-Wavelength Infrared Camera is a C-mount short-wave infrared cooling camera using a nationally produced 640 x 512 InGaAs image sensor, which have CameraLink / USB3 (under development) / GigE (under development) and other data transmission methods. It has the advantages of 900 - 1700nm short-wave infrared wide spectral response, 330,000 resolution, high quantum efficiency and low noise.

MAXCAM-331 Short-Wavelength Infrared Camera can be widely used in short-wave infrared imaging, spectral imaging, monitoring (night vision), semiconductor detection, medicine and biology, optical fiber communication, astronomy, high temperature imaging, humidity distribution imaging and other applications.



## 3.2 MAXCAM-331-CL(20240313)

Table 3-1 MAXCAM-331-CL camera specification

Model Parameter	MAXCAM-331KMA-CL500	MAXCAM-331KMA-CL700	MAXCAM-331KMB-CL500	MAXCAM-331KMB-CL700
	330,000 pixels 3/4" InGaAs CameraLink Camera			
Camera				
Sensor model	National production			
Sensor type	InGaAs CMOS image sensor			
Spectral range	900nm - 1700nm			
pixel size	15 μm x 15 μm			
Target size	3/4"			
ADC	12-bit output /14-bit output (14-bit ADC)			
Frame Rate & Resolution	517 fps @ 640 x 512	724 fps@640 x 512	517 fps @ 640 x 512	724 fps@640 x 512
Memory	512MB			
QE	75%@ 1350nm			
Conversion gain	970.01e-/DN(LG), 18.02e-/DN(MG), 3.31e-/DN (HG)			
Dynamic Range	69.2dB(LG), 63.2dB(MG), 57.4dB(HG) *1			
Read noise	1.3DN(LG), 2.7DN(MG), 5.0DN(HG)			
Full well charge	3.5Me(LG), 70Ke(MG), 12Ke(HG) *1			
Maximum SNR	65.4dB(LG), 48.5dB(MG), 40.7dB(HG)			
Dark current	30fa@0.1V&18°C			
Exposure time range	31.25us~1s	23.81us~1s	31.25us~1s	23.81us~1s
Shutter mode	Global shutter			
Data interface	CameraLink Full			
Digital I/O	1 optocoupler isolated input, 1 optocoupler isolated output			
Data Format	Mono 12 / Mono 14			
Cooling temperature difference	Below room temperature 40 degrees Celsius			
Camera type	Nationally produced devices	Nationally produced devices	High performance	High performance
General parameters				
Power supply	DC12V power supply			
Power consumption	8.4W (TEC OFF) / <16W (TEC ON )			
Temperature	Working temperature -30 ~ 60 °C, storage temperature - 40 ~ 85 °C			
Humidity	20%-80%, non-condensing			
Size	68mm×68mm×90.3mm			
Weight	485g			
Lens mount	C-mount interface			
Software	Provide SDK development kit and CL View software based on Delsa acquisition card			

\*1: LG: CDS-OFF, DeNoise-ON; MG: CDS-ON, DeNoise-OFF; HG: CDS-ON, DeNoise-OFF.

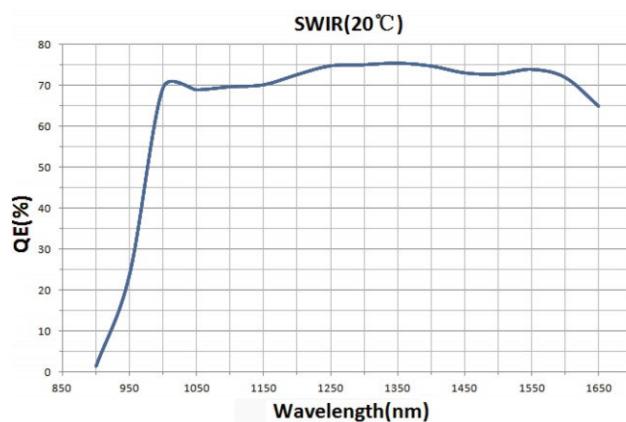


Figure 3-1 The spectral QE of MAXCAM-331 Short-Wavelength Infrared Camera

### 3.3 MAXCAM-331-GigE(20240313)

Table 3-2 MAXCAM-331-GigE camera specification

Model Parameter	MAXCAM-331KMB-G125	MAXCAM-331KMB-G350	MAXCAM-331KMB-G700
	330,000 pixels 3/4" InGaAs CameraLink Camera		
Camera			
Sensor model	National production		
Sensor type	InGaAs CMOS image sensor		
Spectral range	900nm - 1700nm		
pixel size	15 μm x 15 μm		
Target size	3/4"		
ADC	8-bit output /14-bit output (14-bit ADC)		
Frame Rate & Resolution	125@640x512	350@640x512	360@640x512, 700@320x256
Memory	512MB		
QE	75%@ 1350nm		
Conversion gain	138.6e-/ADU(LG), 5.54e-/ADU(MG), 1.2e-/ADU (HG)		
Dynamic Range	70.59dB(LG), 67.96dB(MG), 47.98dB(HG) *1		
Read noise	586.82e(LG), 35.05e(MG), 68.44e(HG)		
Full well charge	1986426.78e(LG), 87649.83Ke(MG), 17147.351e(HG) *1		
Maximum SNR	62.98dB(LG), 49.43dB(MG), 42.34dB(HG)		
Dark current			
Exposure time range	50us~5s	25us~5s	50us~5s
Shutter mode	Global shutter		
Data interface	GigE		
Digital I/O	1 optocoupler isolated input, 1 optocoupler isolated output		
Data Format	Mono 8 / Mono 14		
Cooling temperature difference	Below room temperature 40 degrees Celsius		
General parameters			
Power supply	DC12V power supply		
Power consumption			
Temperature	Working temperature -30 ~ 60 °C, storage temperature - 40 ~ 85 °C		
Humidity	20%-80%, non-condensing		
Size	68mm×68mm×90.3mm		
Weight	485g		
Lens mount	C-mount interface		
Software	Provide SDK development kit and CL View software based on Delsa acquisition card		

\*1: LG: CDS-OFF, DeNoise-ON; MG: CDS-ON, DeNoise-OFF; HG: CDS-ON, DeNoise-OFF.

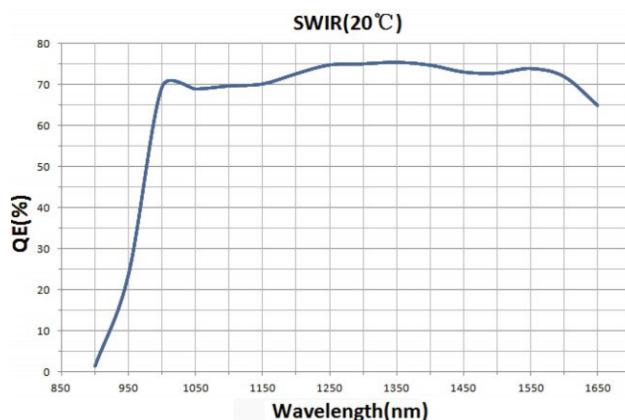


Figure 3-2 The spectral QE of MAXCAM-331 Short-Wavelength Infrared Camera

## 3.4 Packing List of SWIR Series Camera

### 3.4.1 CL Port Camera



Figure 3-3 The packing information of the MAXCAM-331series camera

Table 3-3 The packing information of the MAXCAM-331series camera

Standard Packing information	
A	3-A equipment case: L:28cm W:23cm H:15.5cm (1pcs, 2.8Kg/ box)
B	MAXCAM-331 Short-Wavelength Infrared Camera
C	2 CameraLink cables
D	12V/3A 6 PIN air plug power adapter
E	Power cord. National standard, American standard, European standard, British standard power cord ( E1, E2, E3, E4 ) for choosing
F	One external trigger control cable

### 3.4.2 GigE Port Camera



Figure 3-4 The packing information of the MAXCAM-331series camera

Table 3-4 The packing information of the MAXCAM-331series camera

Standard Packing information	
B	3-A equipment case: L:28cm W:23cm H:15.5cm (1pcs, 2.8Kg/ box)
C	MAXCAM-331 Short-Wavelength Infrared Camera
D	2 CameraLink cables 12V/3A 6 PIN air plug power adapter
E	Power cord. National standard, American standard, European standard, British standard power cord ( E1, E2, E3, E4. Not shown in the figure) for choosing
F	One external trigger control cable
G	GigE cables: G1:3m G2:5m G3:10m (G4:50m. Not shown in the figure)
H	USB flash driver (Driver & utilities software)

## 4 IUA Series Technical Specifications

### 4.1 SCM287-M-TR

Table 4-1 SCM287-M-TR camera specifications

Parameter \ Model	SCM287-M-TR (IUA390KMA)
	0.39Mpixel 1/2.9 "CMOS USB3.0 industrial camera
	Camera
Sensor model	Sony IMX287LLR
Pixel size	6.9 μm x 6.9 μm
Sensor size	1/2.9"
Frame rate	101.5fps@720 x 540
Conversion Gain	2.73 (e-/ADU)
Readout Noise	0.79 (e-)
Full Well	11.2 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.5dB
Peak QE	71%@575nm
Sensitivity	7320mV
Dark current	0.76mV
Gain range	1x-50x
Exposure time	6μs-15sec
Shutter	Global Shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.4W
Temperature	Working temperature -10~50°C; Storage temperature -30~70°C
Humidity	20% - 80% No condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

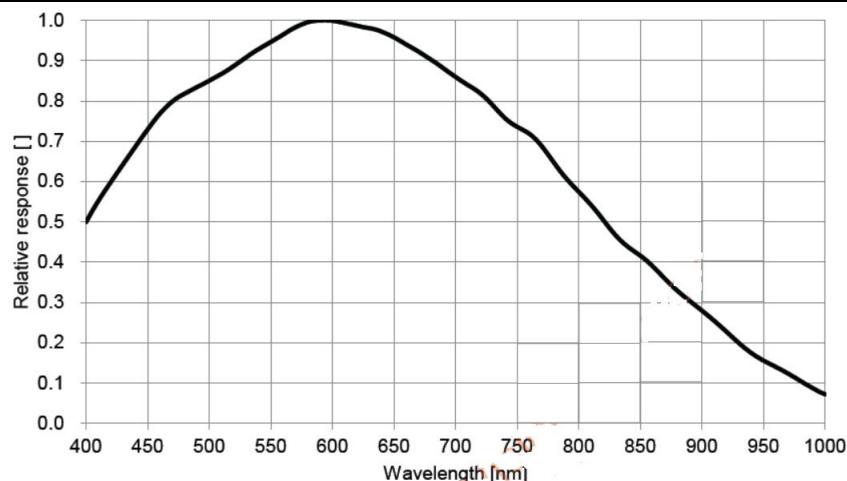


Figure 4-1 SCM287-M-TR spectral response curve

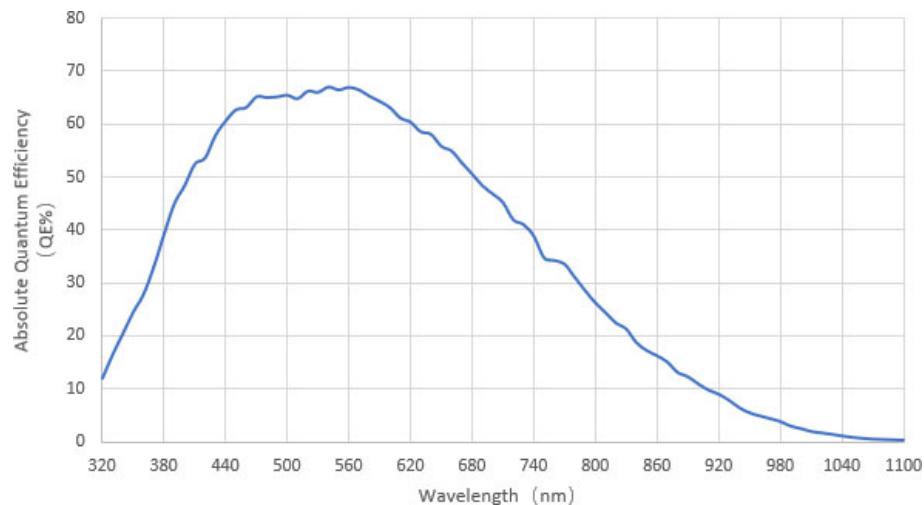


Figure 4-2 SCM287-M-TR absolute quantum efficiency

## 4.2 SCM426-M-TR

Table 4-2 SCM426-M-TR camera specifications

Parameter \ Model	SCM426-M-TR (IUA503KMA)
0.5Mpixel 1/1.7"CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX426LLJ
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$
Sensor size	1/1.7"
Frame rate	79.8fps@800 x 620
Conversion Gain	4.9 (e-/ADU)
Readout Noise	1.41 (e-)
Full Well	20.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	43dB
Peak QE	78%@575nm
Sensitivity	8100mV
Dark current	0.3mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global Shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C; Storage temperature -30~70°C
Humidity	20% - 80% No condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

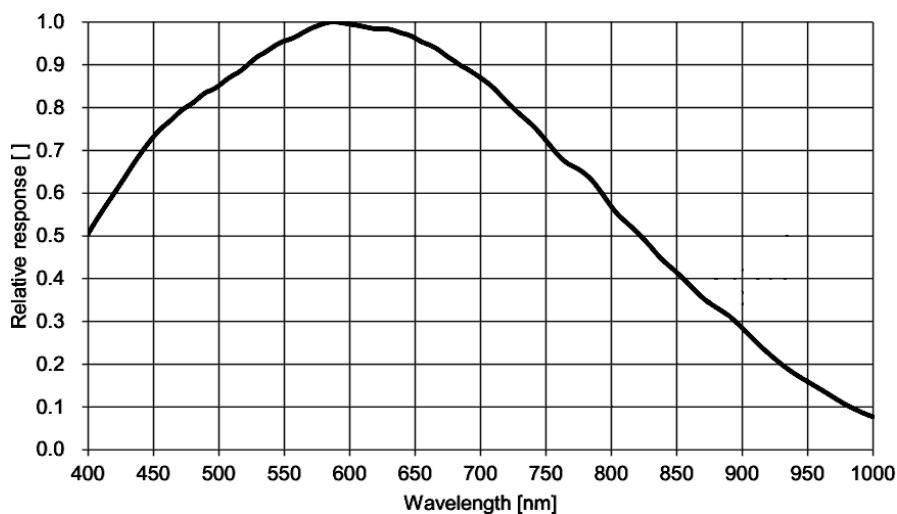


Figure 4-3 SCM426-M-TR spectral response curve

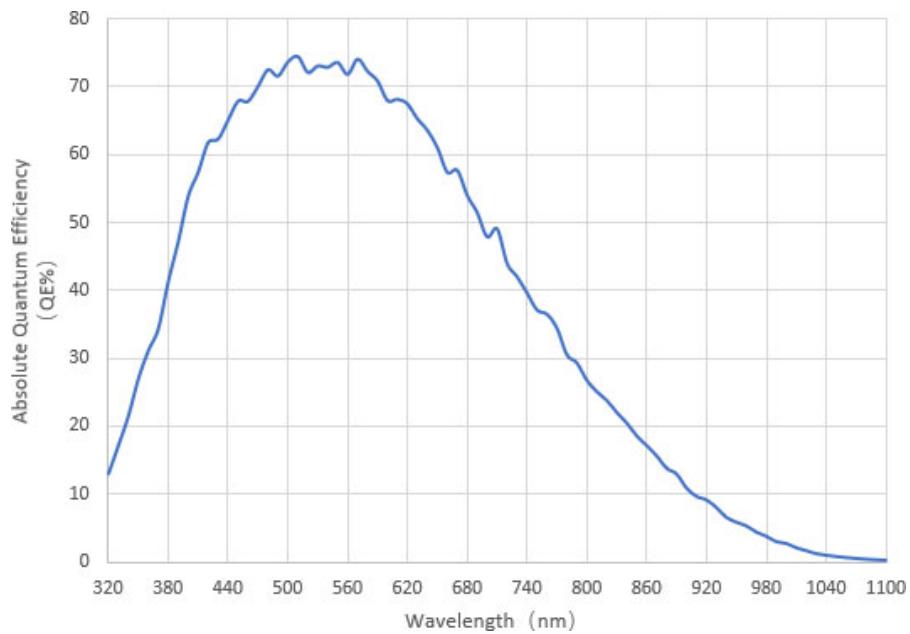


Figure 4-4 SCM426-M-TR absolute quantum efficiency

## 4.3 SCM432-M-TR

Table 4-3 SCM423-M-TR camera specifications

Parameter \ Model	SCM432-M-TR (IUA1700KMA)
0.5pixel1/1.7"CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX433LLJ
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$
Sensor size	1/1.7"
Frame rate	79.8fps@800 x 620
Conversion Gain	4.9 (e-/ADU)
Readout Noise	1.41 (e-)
Full Well	20.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	43dB
Peak QE	78%@575nm
Sensitivity	8100mV
Dark current	0.3mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global Shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C; Storage temperature -30~70°C
Humidity	20% - 80% No condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

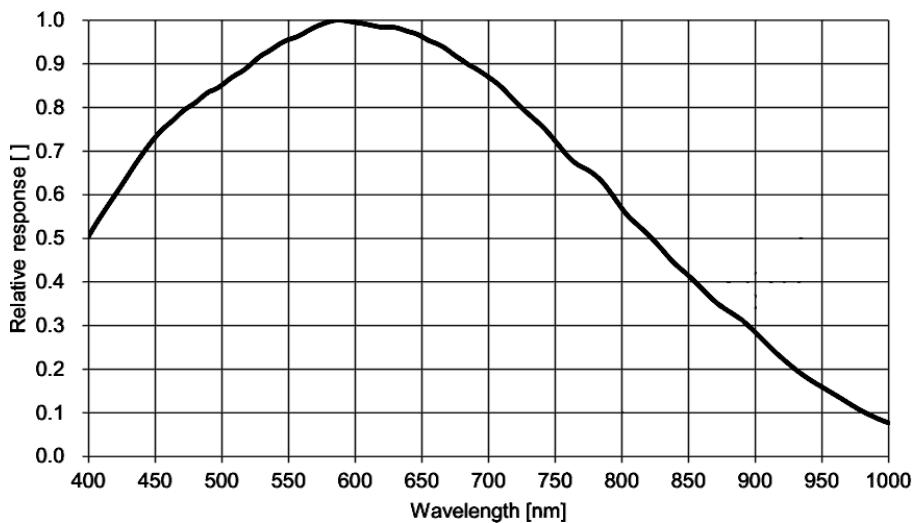


Figure 4-5 SCM423-M-TR spectral response curve

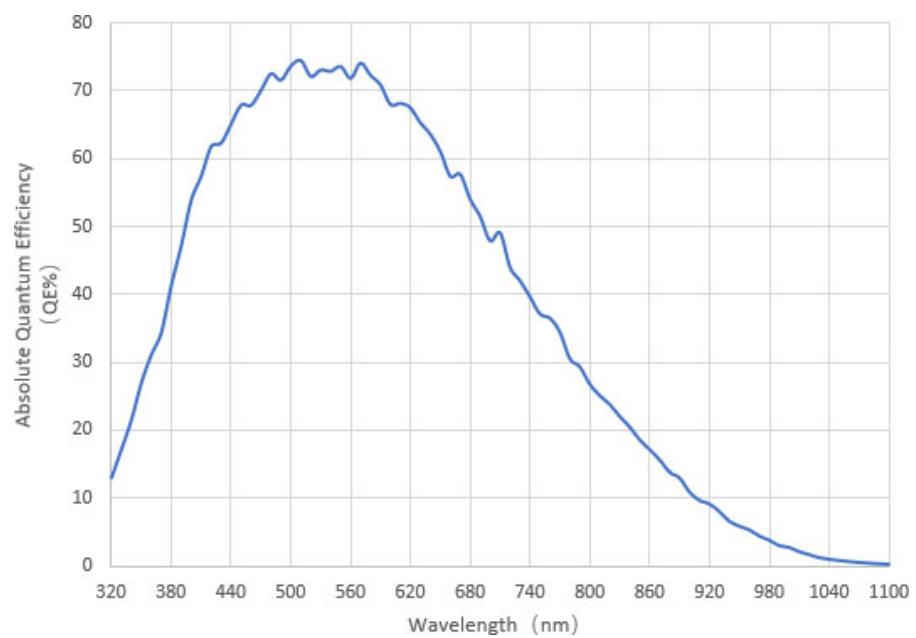


Figure 4-6 SCM423-M-TR absolute quantum efficiency

## 4.4 SCM273-M-TR

Table 4-4 SCM273-M-TR camera specifications

Parameter \ Model	SCM273-M-TR (IUA1500KMA)
<b>1.5M pixels 1/2.9" CMOS USB3.0 industrial camera</b>	
Sensor model	Sony IMX273LLR
Pixel size	3.45 μm × 3.45 μm
Sensor size	1/2.9"
Frame rate	235.5fps@1440 × 1080, 523fps@720 × 540
Conversion Gain	2.68 (e-/ADU)
Readout Noise	2.24 (e-)
Full Well	10.96 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.4dB
Peak QE	71%@575nm
Sensitivity	1830mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	15us-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.2W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	219g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

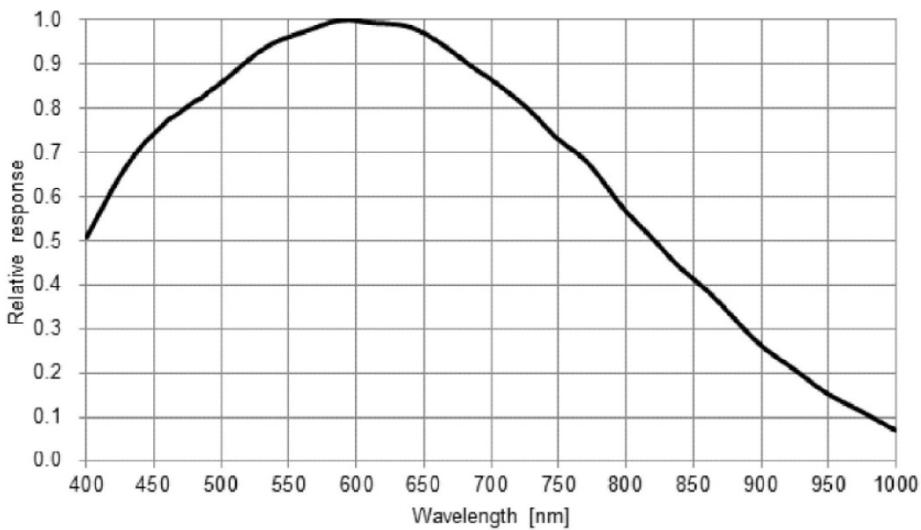


Figure 4-7 SCM273-M-TR spectral response curve

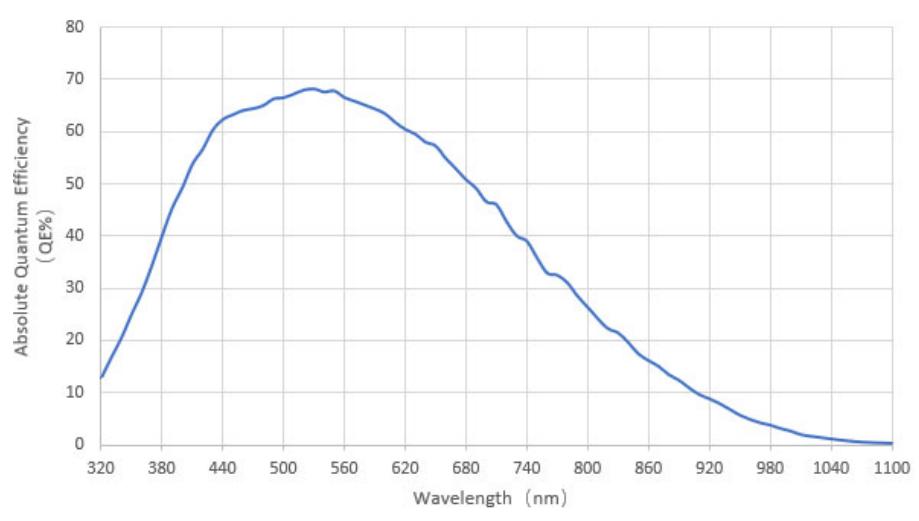


Figure 4-8 SCM273-M-TR absolute quantum efficiency

## 4.5 SCM273-C-TR

Table 4-5 SCM273-C-TR camera specifications

Parameter \ Model	SCM273-C-TR (IUA1500KPA)
<b>1.5M pixels 1/2.9" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX273LQR
Pixel size	3.45 $\mu\text{m} \times 3.45 \mu\text{m}$
Sensor size	1/2.9"
Frame rate	235.5fps@1440 $\times$ 1080, 523fps@720 $\times$ 540
Conversion Gain	2.67 (e-/ADU)
Readout Noise	2.27 (e-)
Full Well	10.94 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.4dB
Sensitivity	1146mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	15us-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.2W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	219g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

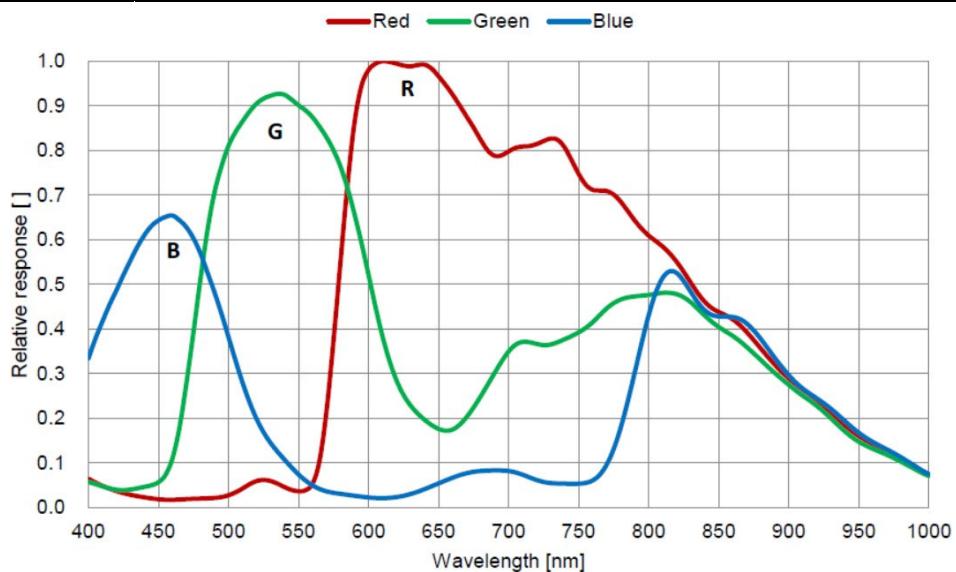


Figure 4-9 SCM273-C-TR spectral response curve

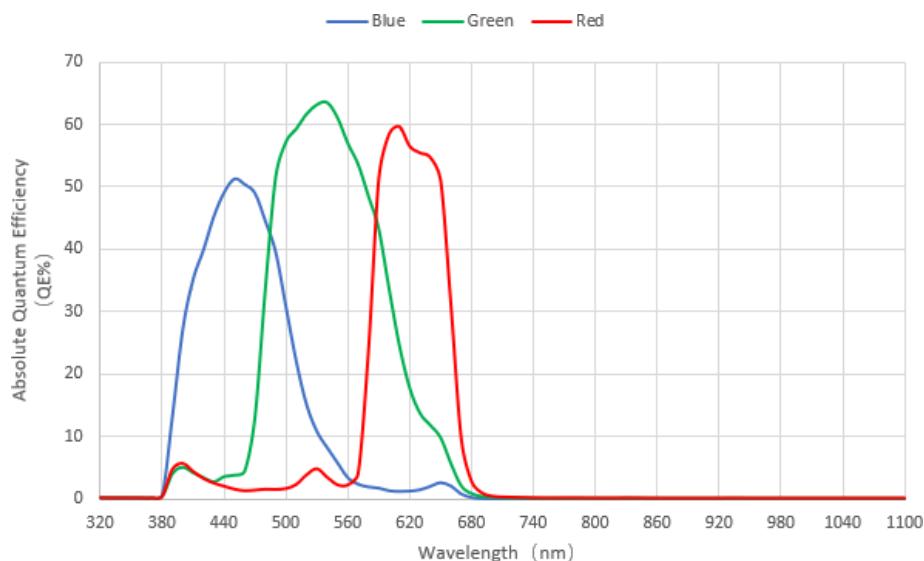


Figure 4-10 SCM273-C-TR absolute quantum efficiency

## 4.6 SCM432-M-TR

Table 4-6 SCM432-M-TR camera specifications

Parameter	Model	SCM432-M-TR (IUA1700KMA) 1.7Mpixel 1.1 "CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX432LLJ	
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$	
Sensor size	1.1"	
Frame rate	98.6fps@1600 x 1100	
Conversion Gain	4.97 (e-/ADU)	
Readout Noise	4.76 (e-)	
Full Well	20.4 (ke-)	
Dynamic range	72dB	
Signal-to-Noise ratio	43dB	
Peak QE	78%@575nm	
Sensitivity	8100mV	
Dark current	0.3mV	
Gain range	1x-50x	
Exposure time	6 $\mu\text{s}$ -15sec	
Shutter	Global Shutter	
Binning	Software2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
<b>General Specifications</b>		
Power supply	Power with USB3.0/ DC12V	
Power consumption	<2.4W	
Temperature	Working temperature -10~50°C; Storage temperature -30~70°C	
Humidity	20% - 80% No condensation	
Size	68mmx68mmx28.1mm	
Weight	228g	
Lens mount	C-mount	
Software	EHDView/SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

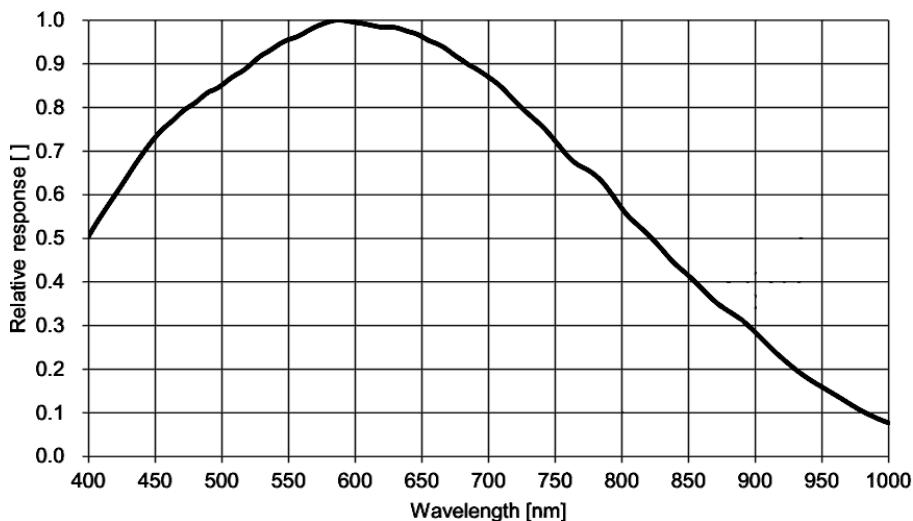


Figure 4-11 SCM432-M-TR spectral response curve

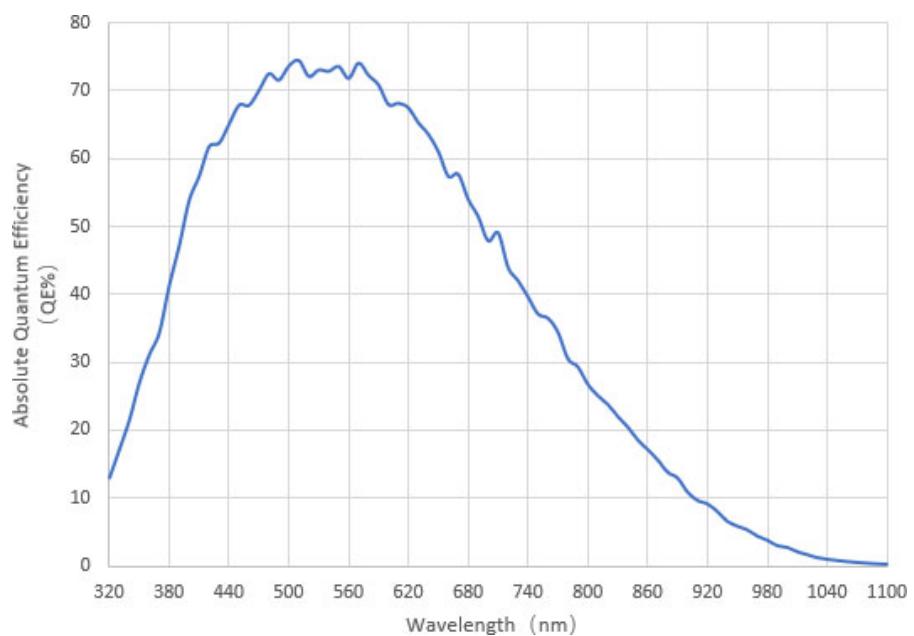


Figure 4-12 SCM432-M-TR absolute quantum efficiency

## 4.7 SCM432-C-TR

Table 4-7 SCM432-C-TR camera specifications

Parameter \ Model	SCM432-C-TR (IUA1700KPA)
1.7M pixels 1.1" CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX432LQJ
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$
Sensor size	1.1"
Frame rate	98.6fps@1600 x 1100
Conversion Gain	4.9 (e-/ADU)
Readout Noise	4.53 (e-)
Full Well	20.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	43dB
Sensitivity	4910mV
Dark current	0.3mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	2.4W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

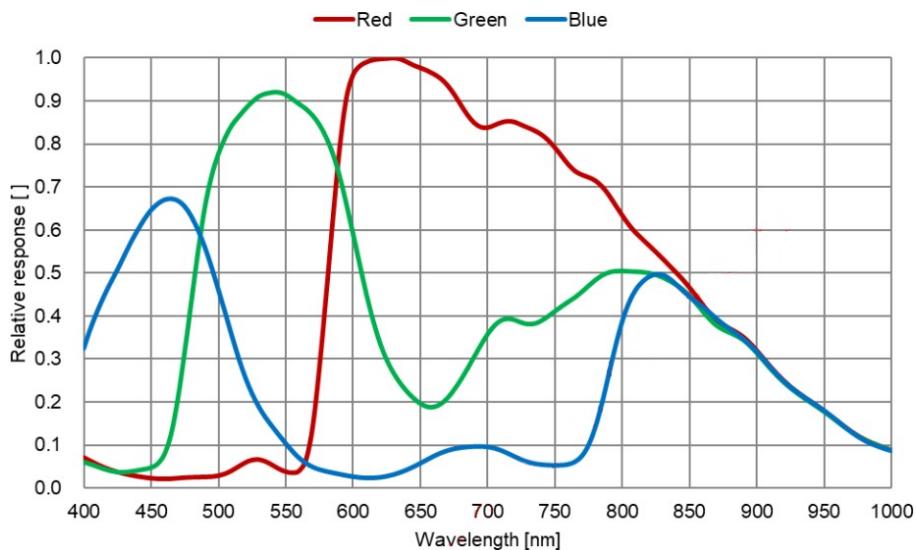


Figure 4-13 SCM432-C-TR spectral response curve

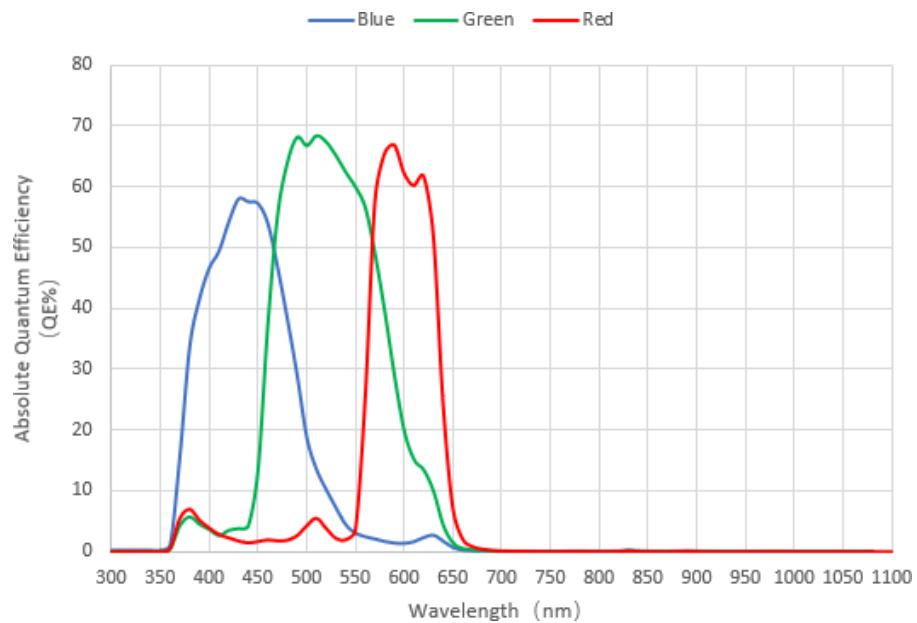


Figure 4-14 SCM432-C-TR absolute quantum efficiency

## 4.8 SCM425-M-TR

Table 4-8 SCM425-M-TR camera specifications

Parameter \ Model	SCXM425-M-TR (IUA1700KMB20230825)
	<b>1.7Mpixel 1.1 "CMOS USB3.0 industrial camera</b>
<b>Camera</b>	
Sensor model	Sony IMX425LLJ
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$
Sensor size	1.1"
Frame rate	210fps@1600 x 1100
Conversion Gain	4.97 (e-/ADU)
Readout Noise	4.76 (e-)
Full Well	20.4 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	43dB
Sensitivity	8100mV
Dark current	0.3mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global Shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.4W
Temperature	Working temperature -10~50°C; Storage temperature -30~70°C
Humidity	20% - 80% No condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

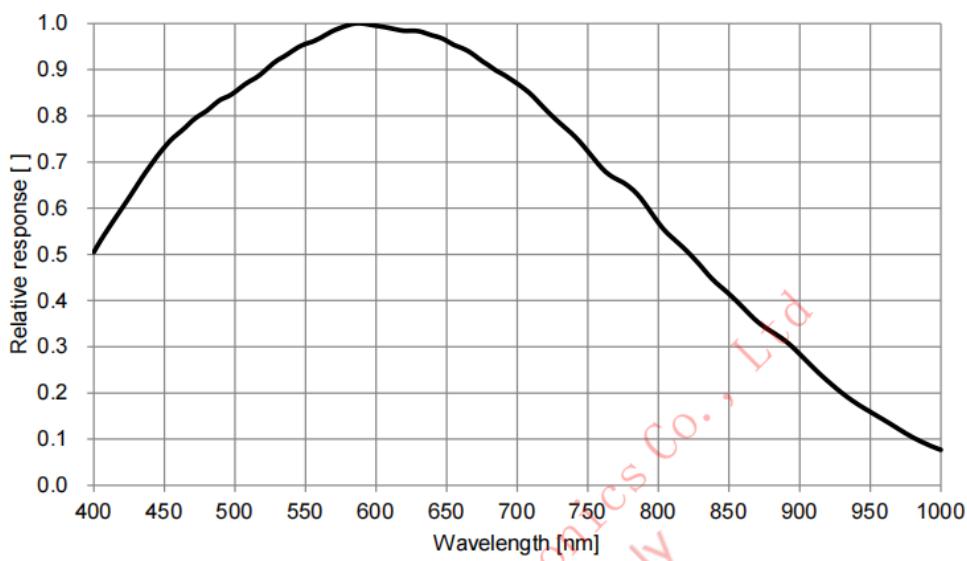


Figure 4-15 SCM425-M-TR spectral response curve

## 4.9 SCM425-C-TR

Table 4-9 SCM425-C-TR camera specifications

Parameter \ Model	SCM425-C-TR (IUA1700KPB20230825)
<b>1.7M pixels 1.1" CMOS USB3.0 industrial camera</b>	
Sensor model	Sony IMX425LQJ
Pixel size	9.0 $\mu\text{m}$ x 9.0 $\mu\text{m}$
Sensor size	1.1"
Frame rate	210fps@1600 x 1100
Conversion Gain	4.9 (e-/ADU)
Readout Noise	4.53 (e-)
Full Well	20.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	43dB
Sensitivity	4910mV
Dark current	0.3mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	2.4W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

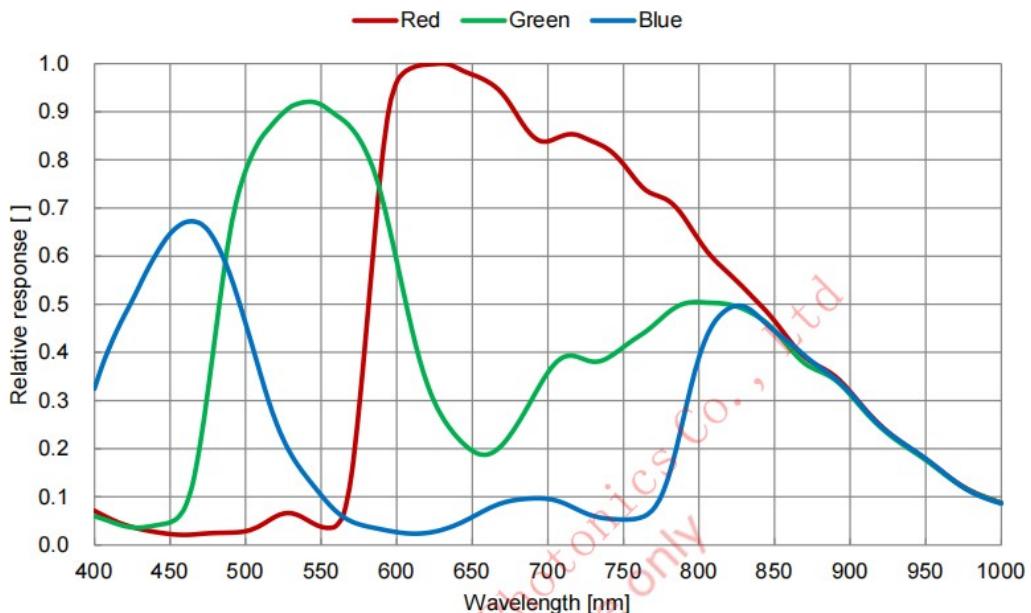


Figure 4-16 SCM425-C-TR spectral response curve

## 4.10 SCM174-M-TR

Table 4-10 SCM174-M-TR camera specifications

Parameter \ Model	SCM174-M-TR (IUA2300KMA)
<b>2.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX174LLJ
Pixel size	5.86 μm x 5.86 μm
Sensor size	1/1.2"
Frame rate	164.5fps@1920 x 1200
Conversion Gain	8.33 (e-/ADU)
Readout Noise	7.12 (e-)
Full Well	34.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	45.3dB
Peak QE	78%@575nm
Sensitivity	1650mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	42μs-15sec
Shutter	Global shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0(USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.5W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

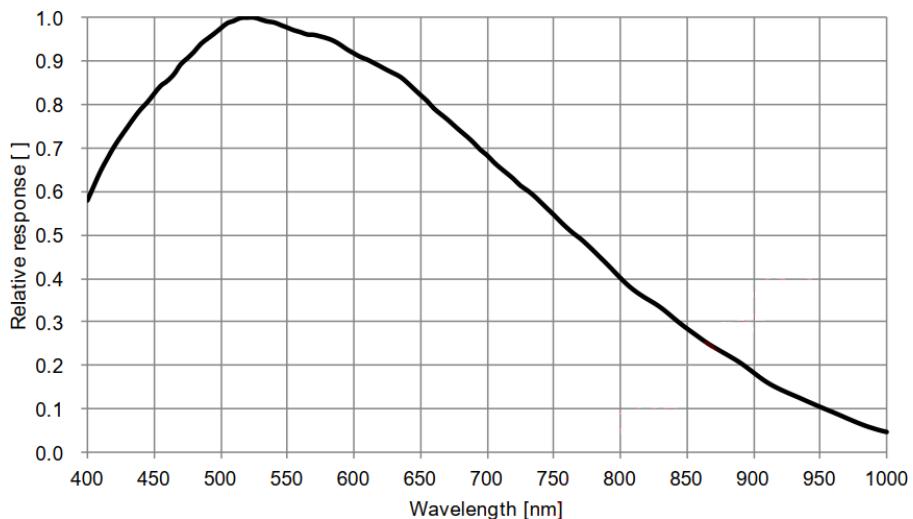


Figure 4-17 SCM174-M-TR spectral response curve

## 4.11 SCM174-C-TR

Table 4-11 SCM174-C-TR camera specifications

Parameter \ Model	SCM174-C-TR (IUA2300KPA)
<b>2.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX174LQJ
Pixel size	5.86 $\mu\text{m}$ x 5.86 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	164.5fps@1920 x 1200
Conversion Gain	8.37 (e-/ADU)
Readout Noise	7.13 (e-)
Full Well	34.3 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	45.4dB
Sensitivity	1016mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	42 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.5W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

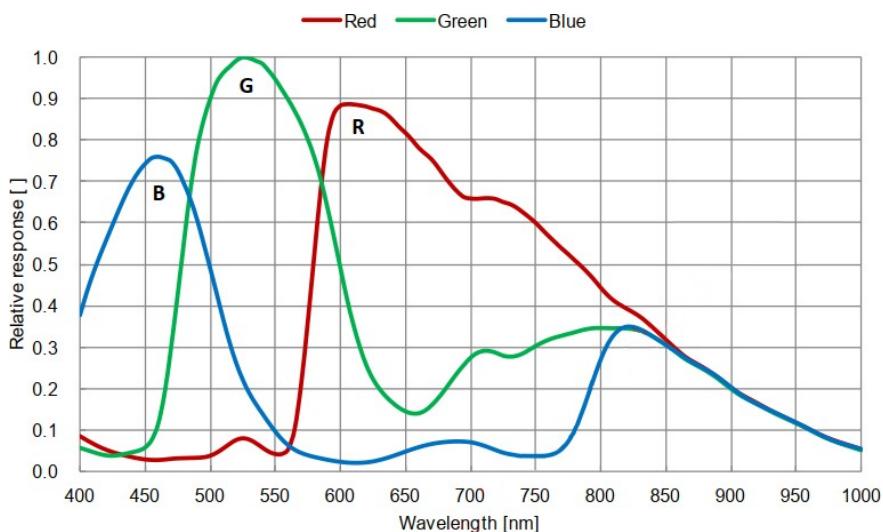


Figure 4-18 SCM174-C-TR spectral response curve

## 4.12 SCM249-M-TR

Table 4-12 SCM249-M-TR camera specifications

Parameter \ Model	SCM249-M-TR (IUA2300KMB)
<b>2.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX249LLJ
Pixel size	5.86 $\mu\text{m}$ x 5.86 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	30fps@1920 x 1200
Conversion Gain	8.5 (e-/ADU)
Readout Noise	8.21 (e-)
Full Well	34.8 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	45.4dB
Peak QE	78%@575nm
Sensitivity	1650mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	42 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.9W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

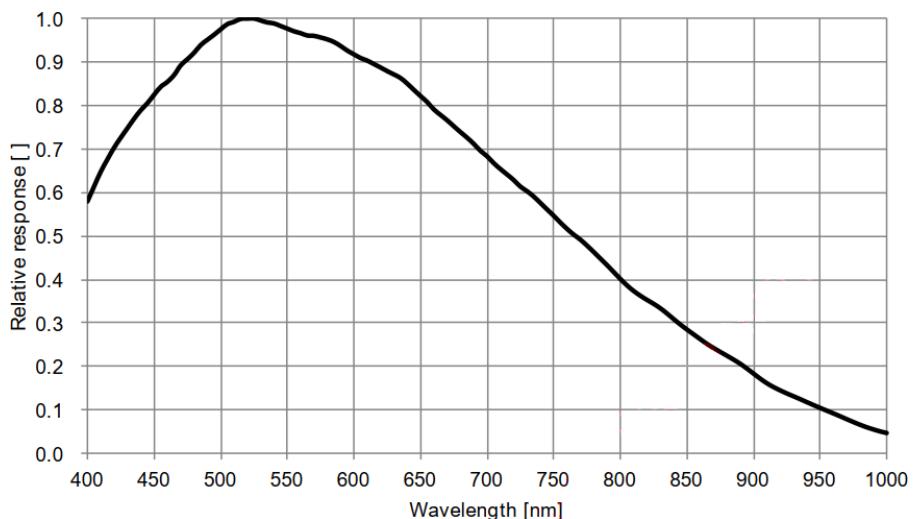


Figure 4-19 SCM249-M-TR spectral response curve

## 4.13 SCM249-C-TR

Table 4-13 SCM249-C-TR camera specifications

Parameter \ Model	SCM249-C-TR (IUA2300KPB)
<b>2.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX249LQJ
Pixel size	5.86 $\mu\text{m}$ x 5.86 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	30fps@1920 x 1200
Conversion Gain	8.22 (e-/ADU)
Readout Noise	7.72 (e-)
Full Well	33.7 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	45.3dB
Sensitivity	1016mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	42 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.9W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

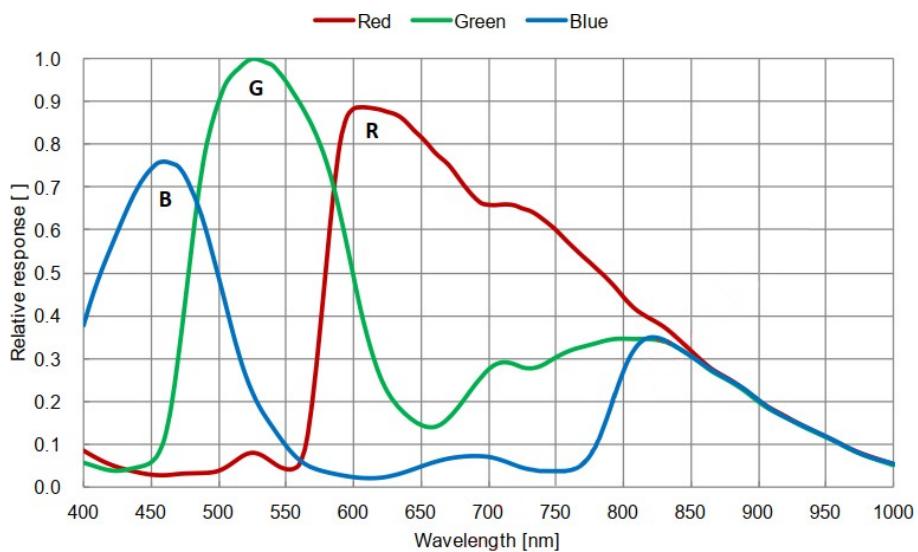


Figure 4-20 SCM249-C-TR spectral response curve

## 4.14 SCM421-M-TR

Table 4-14 SCM421-M-TR camera specifications

Parameter \ Model	SCM421-M-TR (IUA2800KMA)
<b>2.8Mpixels 2/3" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX421LLJ
Pixel size	4.5 $\mu\text{m}$ x 4.5 $\mu\text{m}$
Sensor size	2/3"
Frame rate	121fps@1936 $\times$ 1464, 425fps@968 $\times$ 732
Conversion Gain	2.73 (e-/ADU)
Readout Noise	2.56 (e-)
Full Well	11.2 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.5dB
Peak QE	78%@575nm
Sensitivity	3354mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

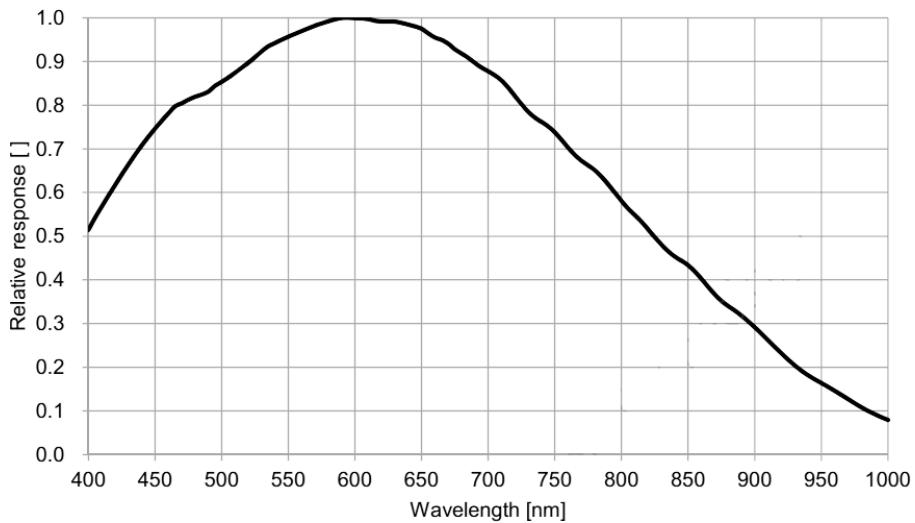


Figure 4-21 SCM421-M-TR spectral response curve

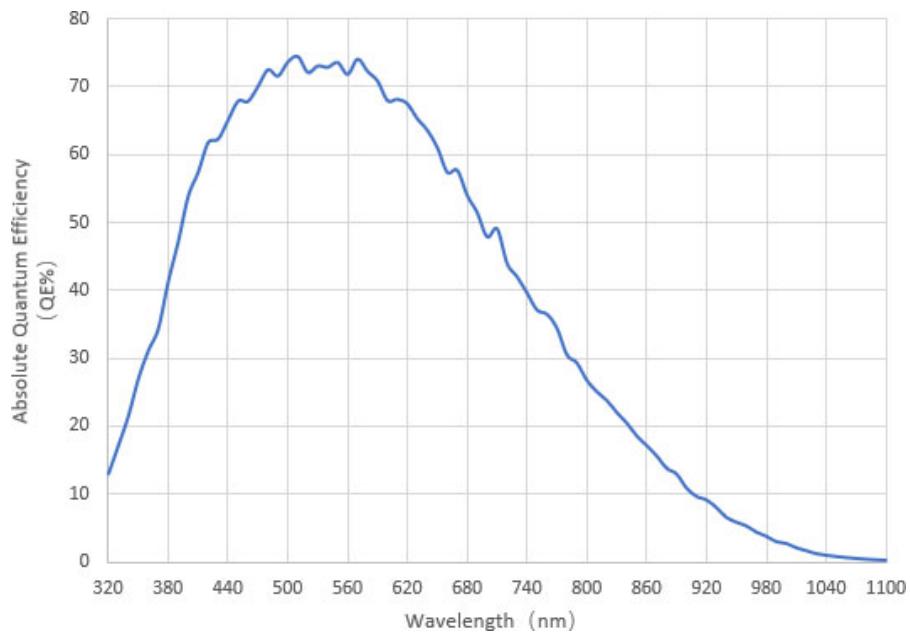


Figure 4-22 SCM421-M-TR absolute quantum efficiency

## 4.15 SCM421-C-TR

Table 4-15 SCM421-C-TR camera specifications

Parameter \ Model	SCM421-C-TR (IUA2800KPA)
2.8Mpixels 2/3" CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX421LQJ
Pixel size	4.5 $\mu\text{m}$ x 4.5 $\mu\text{m}$
Sensor size	2/3"
Frame rate	121fps@1936 $\times$ 1464, 425fps@968 $\times$ 732
Conversion Gain	2.69 (e-/ADU)
Readout Noise	2.55 (e-)
Full Well	11.0 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.4dB
Sensitivity	2058mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

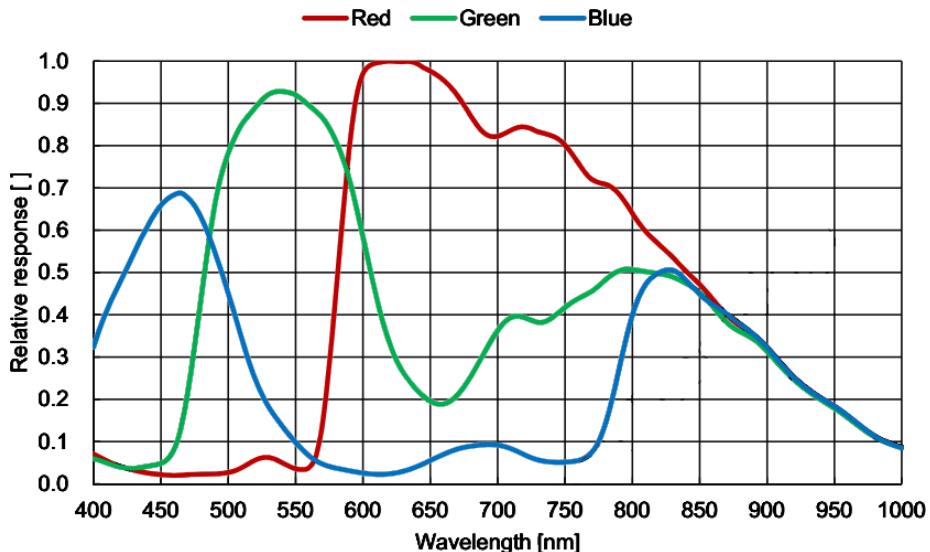


Figure 4-23 SCM421-C-TR spectral response curve

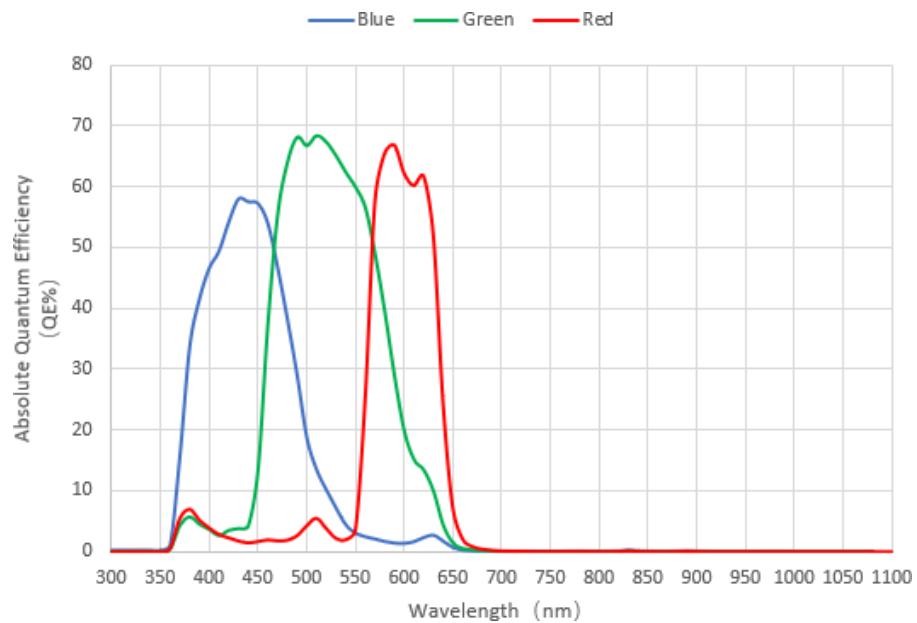


Figure 4-24 SCM421-C-TR absolute quantum efficiency

## 4.16 SCM264-M-TR

Table 4-16 SCM264-M-TR camera specifications

Parameter	Model	SCM264-M-TR (IUA5000KMA) 5.0M pixels 2/3" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX264LLR	
Pixel size	3.45 $\mu\text{m} \times 3.45 \mu\text{m}$	
Sensor size	2/3"	
Frame rate	35.6fps@2448 $\times$ 2048, 87.6fps@1224 $\times$ 1024	
Conversion Gain	2.71 (e-/ADU)	
Readout Noise	2.12 (e-)	
Full Well	11.1 (ke-)	
Dynamic range	72dB	
Signal-to-Noise ratio	40.5dB	
Peak QE	71%@575nm	
Sensitivity	1830mV	
Dark current	0.15mV	
Gain range	1x-50x	
Exposure time	15us-15sec	
Shutter	Global shutter	
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
<b>General Specifications</b>		
Power supply	Power with USB3.0/ DC12V	
Power consumption	<2.1W	
Temperature	Working temperature -10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	68mmx68mmx28.1mm	
Weight	219g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC, RoHS	

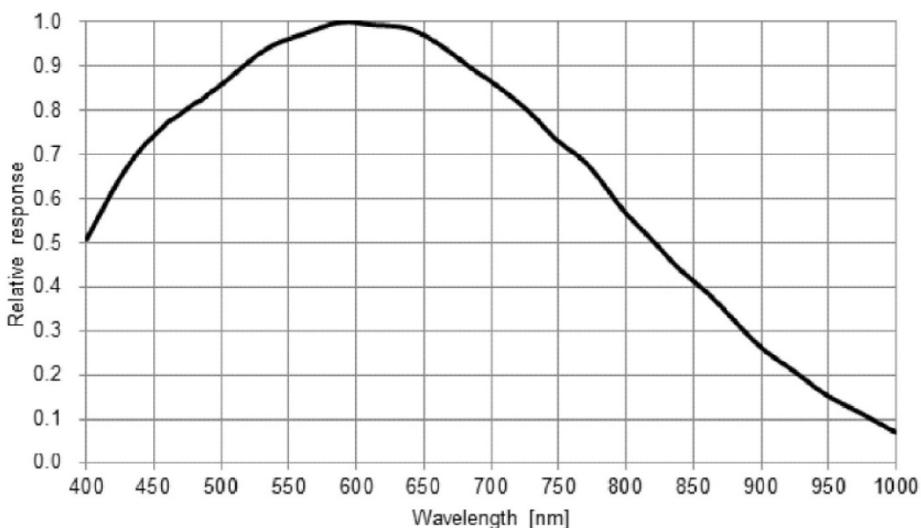


Figure 4-25 SCM264-M-TR spectral response curve

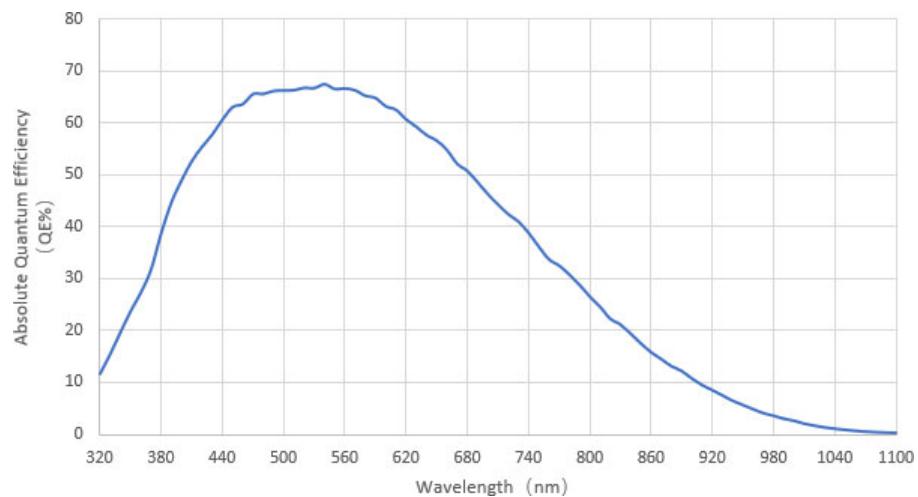


Figure 4-26 SCM264-M-TR absolute quantum efficiency

## 4.17 SCM264-C-TR

Table 4-17 SCM264-C-TR camera specifications

Parameter \ Model	SCM264-C-TR (IUA5000KPA)
5.0M pixels 2/3" CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX264LQR
Pixel size	3.45 $\mu\text{m} \times 3.45 \mu\text{m}$
Sensor size	2/3"
Frame rate	35.6fps@2448 $\times$ 2048, 87.6fps@1224 $\times$ 1024
Conversion Gain	2.68 (e-/ADU)
Readout Noise	2.11 (e-)
Full Well	11.0 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.4dB
Sensitivity	1146mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	15us-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.1W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	219g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

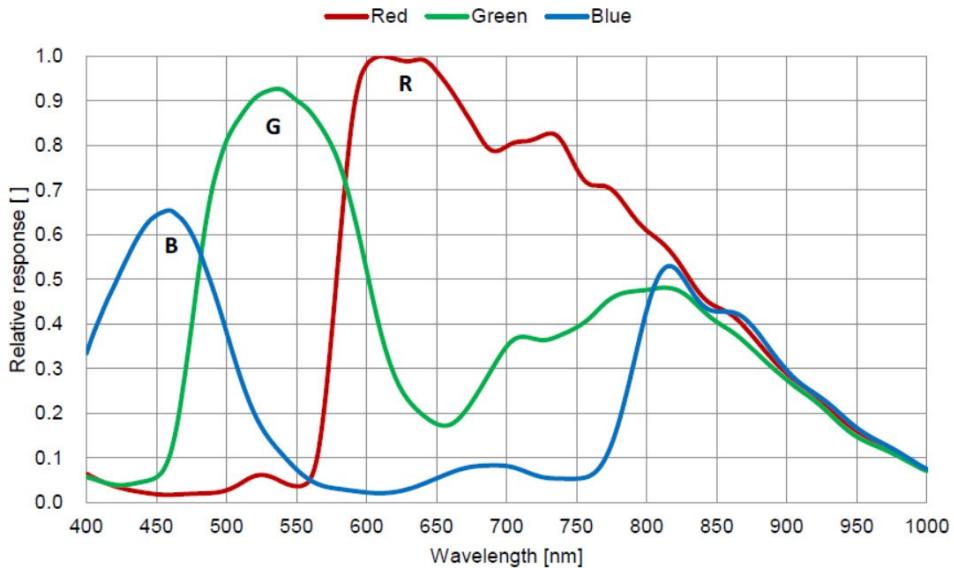


Figure 4-27 SCM264-C-TR spectral response curve

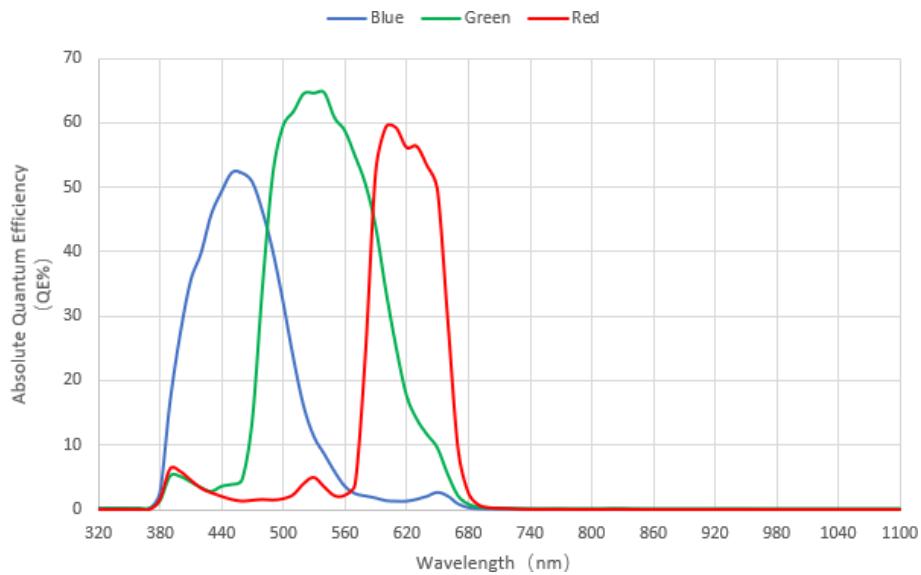


Figure 4-28 SCM264-C-TR absolute quantum efficiency

## 4.18 SCM547-M-TR

Table 4-18 SCM547-M-TR camera specifications

Parameter \ Model	SCM547-M-TR (IUA5100KMA)
<b>5.1M pixels 1/1.8" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX547-AAMJ-C
Pixel size	2.74 $\mu\text{m} \times 2.74 \mu\text{m}$
Sensor size	1/1.8"
Frame rate	63fps@2448 $\times$ 2048, 208.4fps@1224 $\times$ 1024
Conversion Gain	2.35 (e-/ADU)
Readout Noise	2.19 (e-)
Full Well	9.6 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Sensitivity	2252mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30us-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

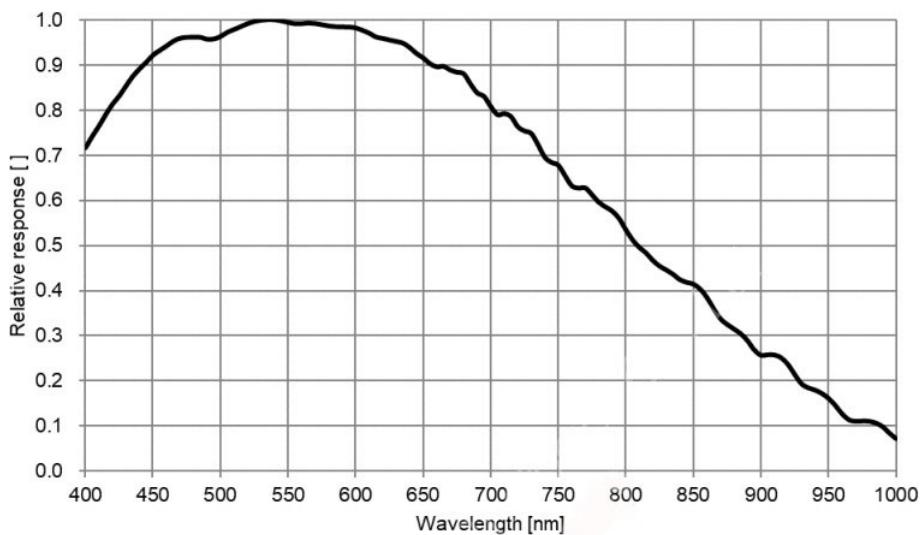


Figure 4-29 SCM547-M-TR spectral response curve

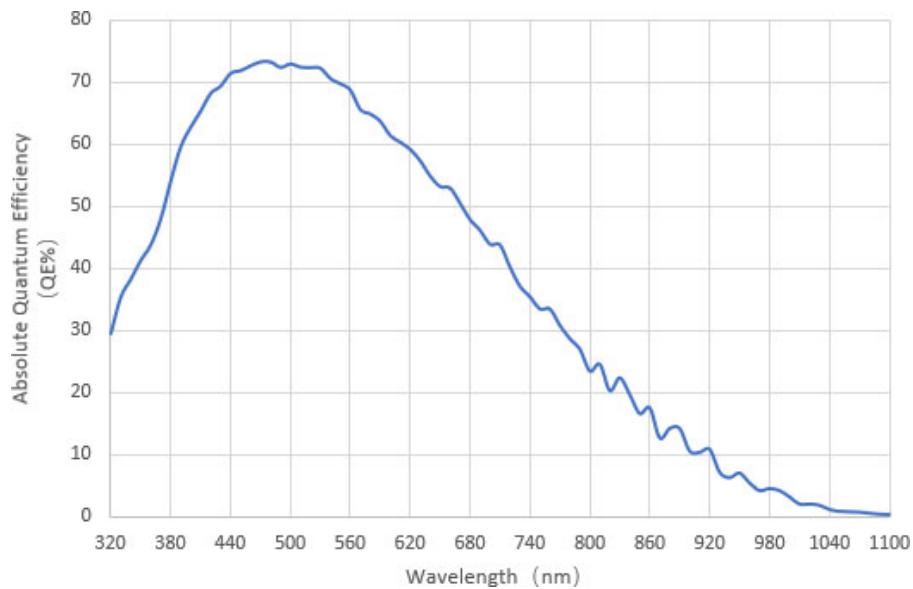


Figure 4-30 SCM547-M-TR absolute quantum efficiency

## 4.19 SCM547-C-TR

Table 4-19 SCM547-C-TR camera specifications

Parameter \ Model	SCM547-C-TR (IUA5100KMB)
<b>5.1M pixels 1/1.8" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX547-AAQJ-C
Pixel size	2.74 $\mu\text{m} \times 2.74 \mu\text{m}$
Sensor size	1/1.8"
Frame rate	63fps@2448 $\times$ 2048, 159fps@1224 $\times$ 1024
Conversion Gain	2.44 (e-/ADU)
Readout Noise	2.22 (e-)
Full Well	10.0 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Sensitivity	1337mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30us-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

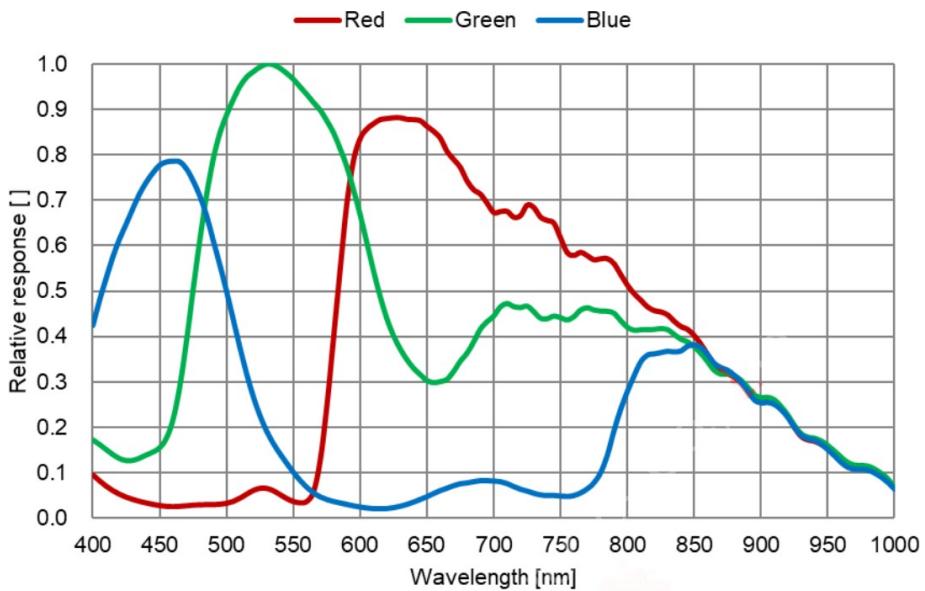


Figure 4-31 SCM547-C-TR spectral response curve

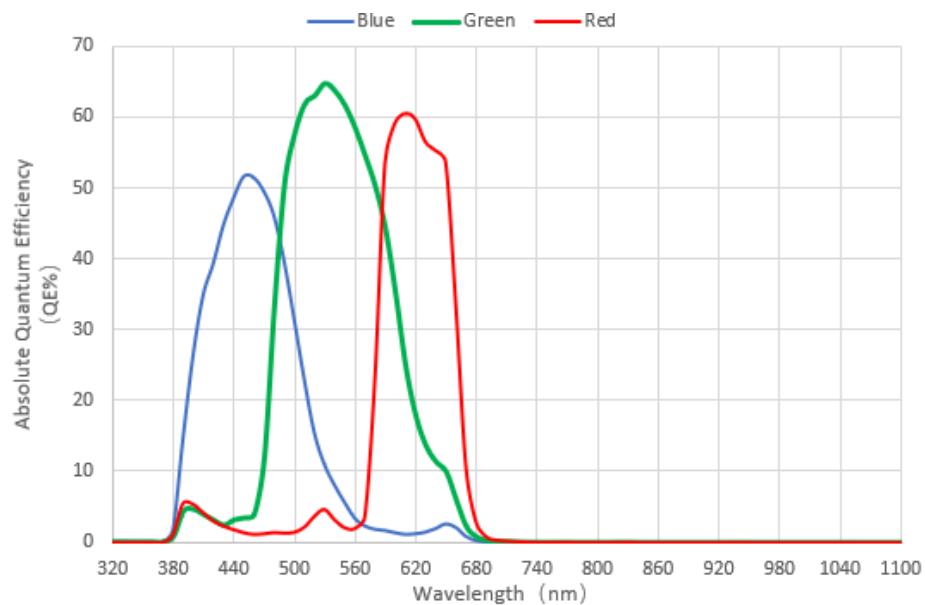


Figure 4-32 SCM547-C-TR absolute quantum efficiency

## 4.20 SCM178-M-TR

Table 4-20 SCM178-M-TR camera specifications

Parameter \ Model	SCM178-M-TR (IUA6300KMA)
<b>6.3M pixels 1/1.8" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX178LLJ
Pixel size	2.4 $\mu\text{m}$ x 2.4 $\mu\text{m}$
Sensor size	1/1.8"
Frame rate	59.9fps@3072 x 2048, 59.9fps@1536 x 1024
Conversion Gain	2.54 (e-/ADU)
Readout Noise	2.14 (e-)
Full Well	10.4 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.2dB
Sensitivity	760mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	17 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.9W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

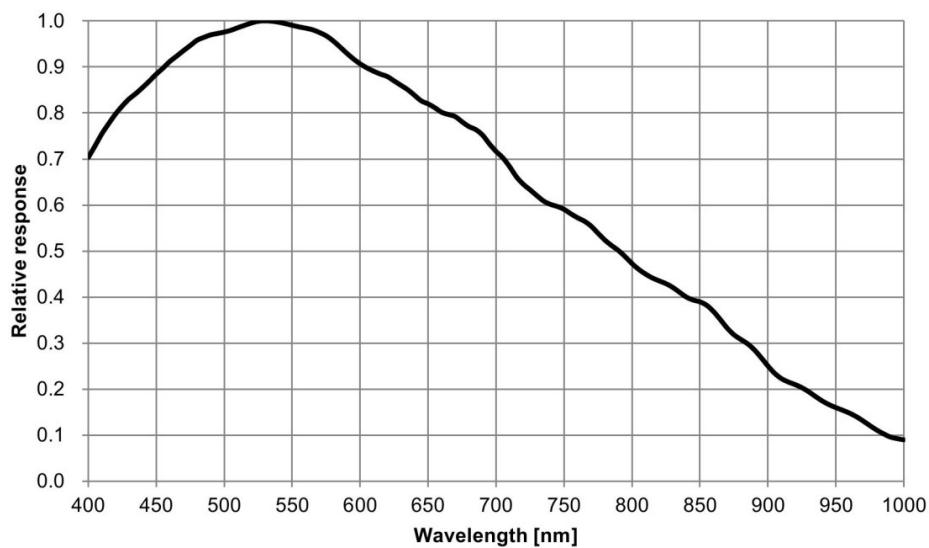


Figure 4-33 SCM178-M-TR spectral response curve

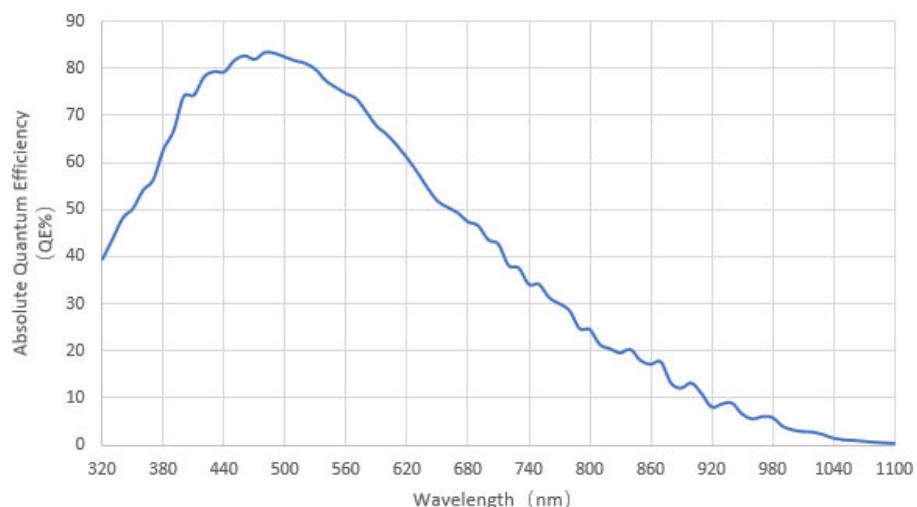


Figure 4-34 SCM178-M-TR absolute quantum efficiency

## 4.21 SCM178-C-TR

Table 4-21 SCM178-C-TR camera specifications

Parameter \ Model	SCM178-C-TR (IUA6300KPA)
<b>6.3M pixels 1/1.8" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX178LQJ
Pixel size	2.4 $\mu\text{m}$ x 2.4 $\mu\text{m}$
Sensor size	1/1.8"
Frame rate	59.8fps@3072 x 2048, 59.5fps@1536 x 1024
Conversion Gain	2.64 (e-/ADU)
Readout Noise	2.12 (e-)
Full Well	10.8 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.3dB
Sensitivity	425mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	17 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.6W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	217g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

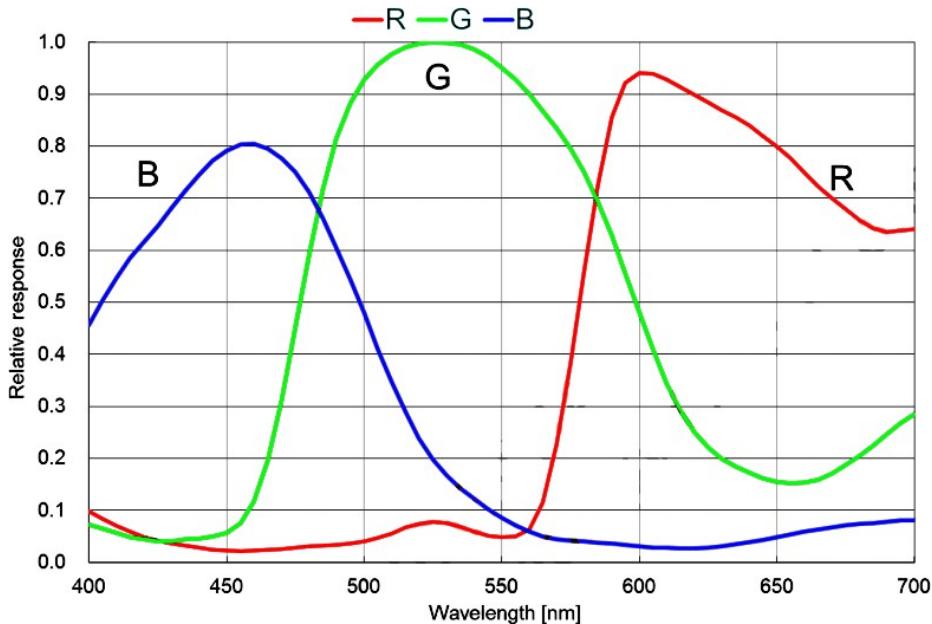


Figure 4-35 SCM178-C-TR spectral response curve

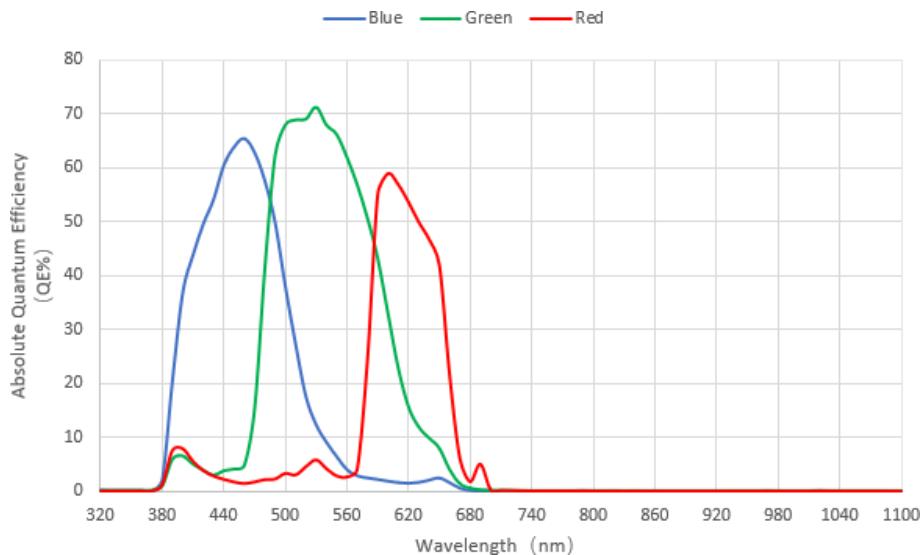


Figure 4-36 SCM178-C-TR absolute quantum efficiency

## 4.22 SCM428-M-TR

Table 4-22 SCM428-M-TR camera specifications

Parameter \ Model	SCM428-M-TR (IUA7100KMA)
7.1M pixels 1.1" CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX428LLJ
Pixel size	4.5 $\mu\text{m}$ x 4.5 $\mu\text{m}$
Sensor size	1.1"
Frame rate	51.3fps@3200 x 2200, 133.8fps@1584 x 1100
Conversion Gain	2.77 (e-/ADU)
Readout Noise	2.63 (e-)
Full Well	11.3 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.6dB
Peak QE	78%@575nm
Sensitivity	3354mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

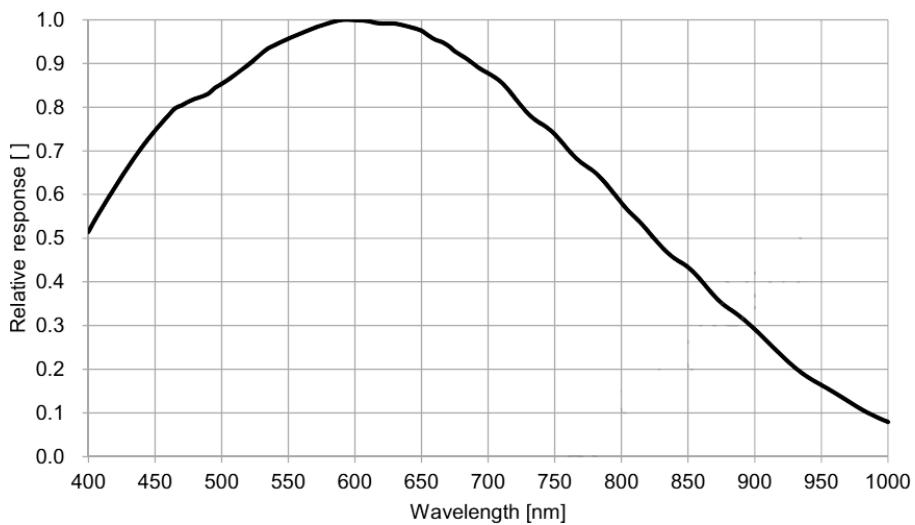


Figure 4-37 SCM428-M-TR spectral response curve

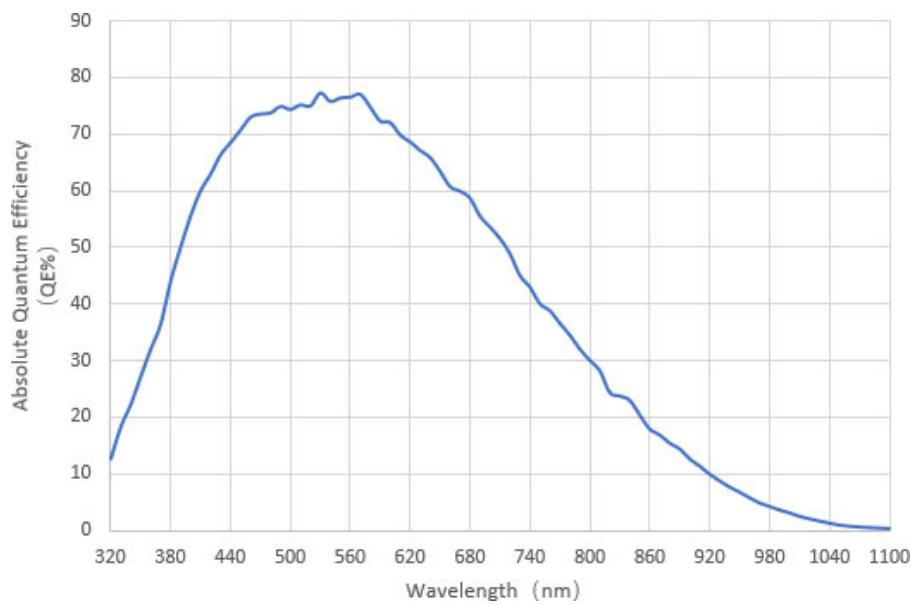


Figure 4-38 SCM428-M-TR absolute quantum efficiency

## 4.23 SCM428-C-TR

Table 4-23 SCM428-C-TR camera specifications

Parameter \ Model	SCM428-C-TR (IUA7100KPA)
7.1M pixels 1.1" CMOS USB3.0 industrial camera	
Camera	
Sensor model	Sony IMX428LQJ
Pixel size	4.5 $\mu\text{m}$ x 4.5 $\mu\text{m}$
Sensor size	1.1"
Frame rate	51.4fps@3200 x 2200, 133.8fps@1584 x 1100
Conversion Gain	2.74 (e-/ADU)
Readout Noise	2.54 (e-)
Full Well	11.2 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.5dB
Sensitivity	2058mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	6 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
General Specifications	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C, storage temperature 30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

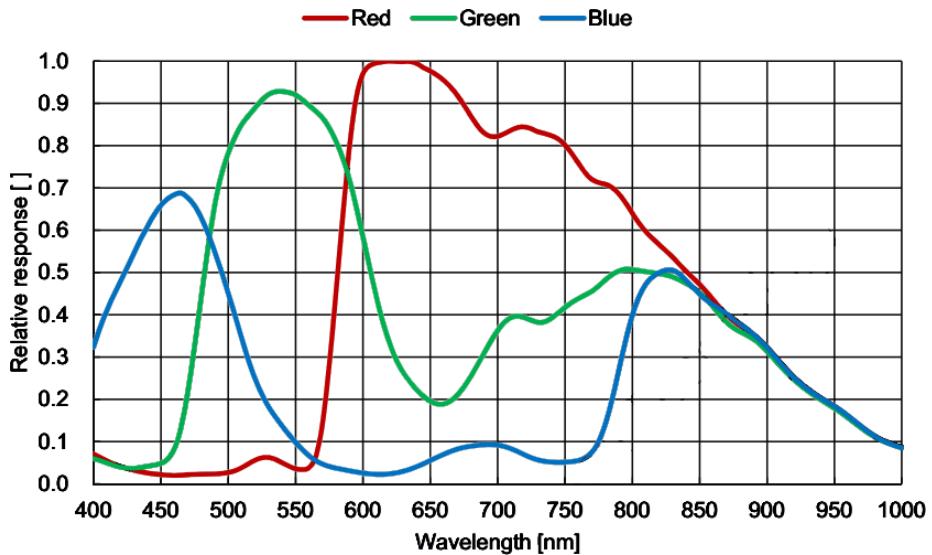


Figure 4-39 SCM428-C-TR spectral response curve

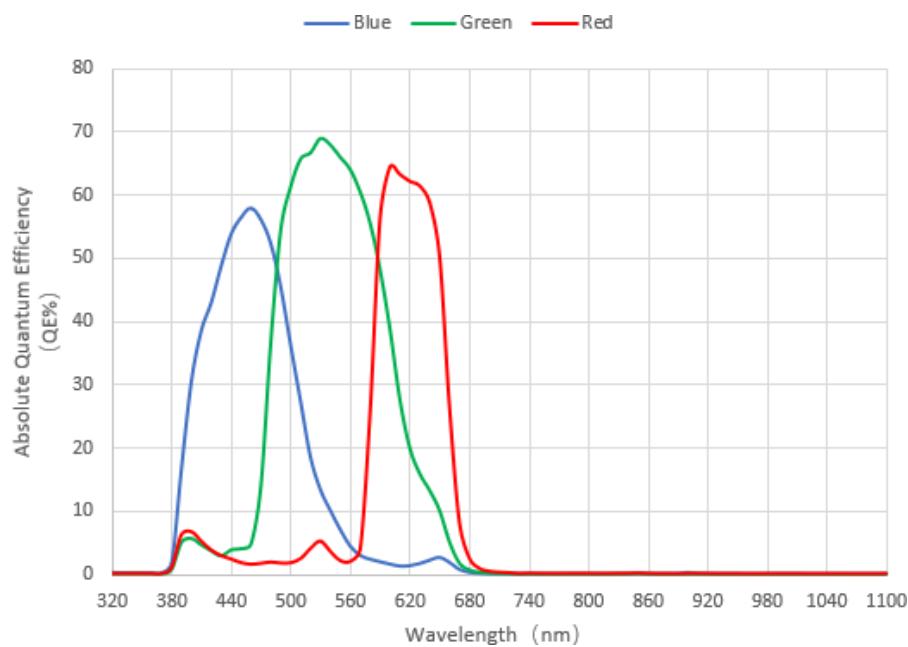


Figure 4-40 SCM428-C-TR absolute quantum efficiency

## 4.24 SCM485-C-TR

Table 4-24 SCM485-C-TR camera specifications

Parameter \ Model	SCM485-C-TR (IUA8300KPA)
<b>8.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX485LQJ-C
Pixel size	2.9 $\mu\text{m}$ x 2.9 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	45fps@3840 x2160, 70fps@1920 x 1080
Conversion Gain	HCG: 1.21 / LCG: 3.28 (e-/ADU)
Readout Noise	HCG: 1.15 / LCG: 3.0 (e-)
Full Well	HCG: 4.97 / LCG: 13.4 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	HCG: 37.0 / LCG: 41.3 (dB)
Sensitivity	2188mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	20 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

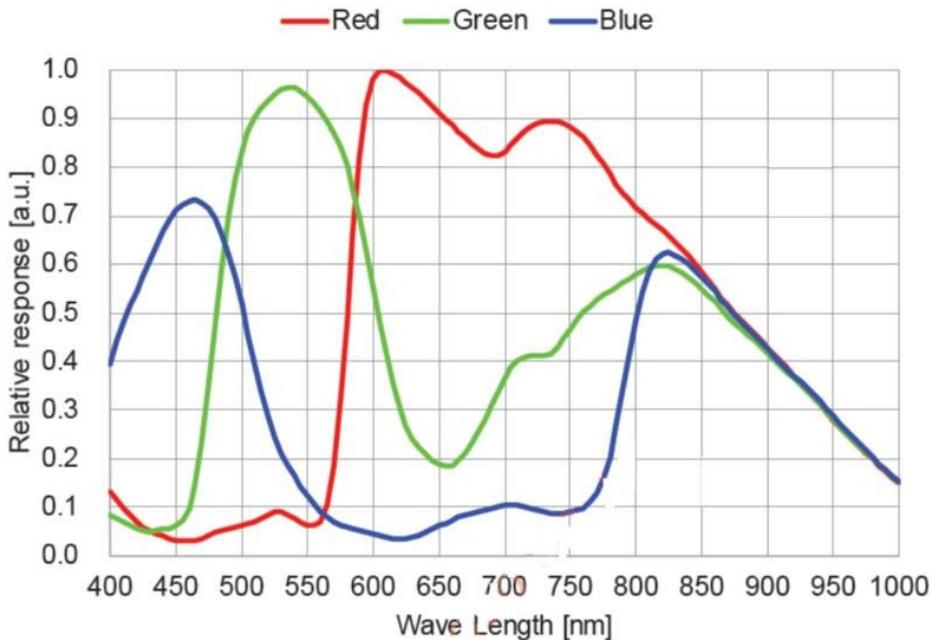


Figure 4-41 SCM485-C-TR spectral response curve

## 4.25 SCM585-M-TR

Table 4-25 SCM585-M-TR camera specifications

Parameter \ Model	SCM585-M-TR (IUA8300KMB) 8.3M pixels 1/1.2" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX585-AAMJ1-C
Pixel size	2.9 $\mu\text{m}$ x 2.9 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	45fps@3840 x2160, 70fps@1920 x 1080
Conversion Gain	TBD
Readout Noise	TBD
Full Well	TBD
Dynamic range	TBD
Signal-to-Noise ratio	TBD
Sensitivity	9560mV
Dark current	0.13mV
Gain range	1x-50x
Exposure time	20 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

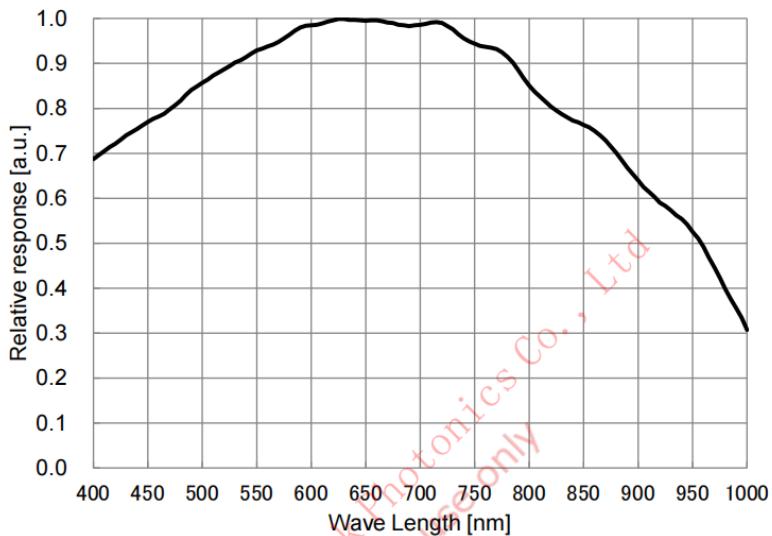


Figure 4-42 SCM585-M-TR spectral response curve

## 4.26 SCM585-C-TR

Table 4-26 SCM585-C-TR camera specifications

Parameter \ Model	SCM585-C-TR (IUA8300KPB)
<b>8.3M pixels 1/1.2" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX585-AAQJ1-C
Pixel size	2.9 $\mu\text{m}$ x 2.9 $\mu\text{m}$
Sensor size	1/1.2"
Frame rate	45fps@3840 x2160, 70fps@1920 x 1080
Conversion Gain	HCG: 1.01 / LCG: 9.29 (e-/ADU)
Readout Noise	HCG: 0.37 / LCG: 2.68 (e-)
Full Well	HCG: 4.12 / LCG: 38.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	HCG: 36.2 / LCG: 45.8 (dB)
Sensitivity	5970mV
Dark current	0.13mV
Gain range	1x-50x
Exposure time	20 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

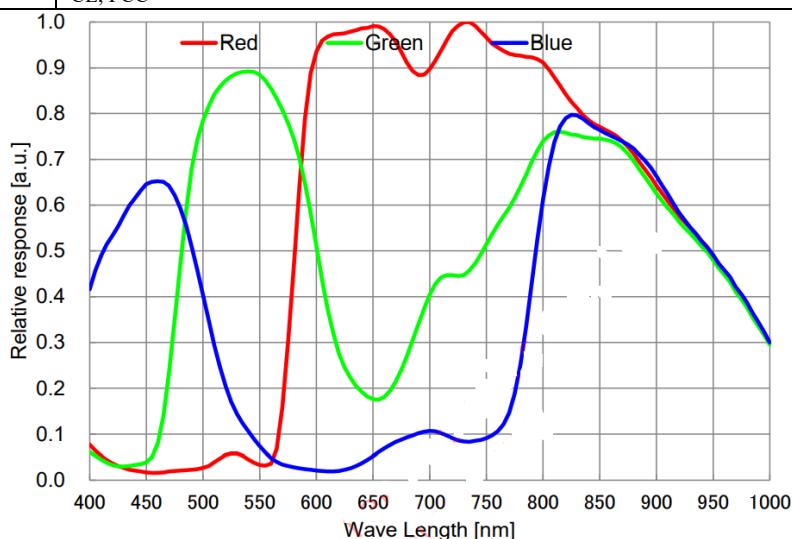


Figure 4-43 SCM585-C-TR spectral response curve

## 4.27 SCM687-M-TR

Table 4-27 SCM687-M-TR camera specifications

Parameter \ Model	SCM687-M-TR (IUA8300KME)
<b>8.3M pixels 1/1.8" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	Sony IMX678-AAMR1-C
Pixel size	2.0 $\mu\text{m}$ x 2.0 $\mu\text{m}$
Sensor size	1/1.8"
Frame rate	45fps@3840 x2160、70fps@1920 x 1080
Conversion Gain	TBD
Readout Noise	TBD
Full Well	TBD
Dynamic range	TBD
Signal-to-Noise ratio	TBD
Sensitivity	11288mV
Dark current	0.15mV
Gain range	1-50 倍
Exposure time	20 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

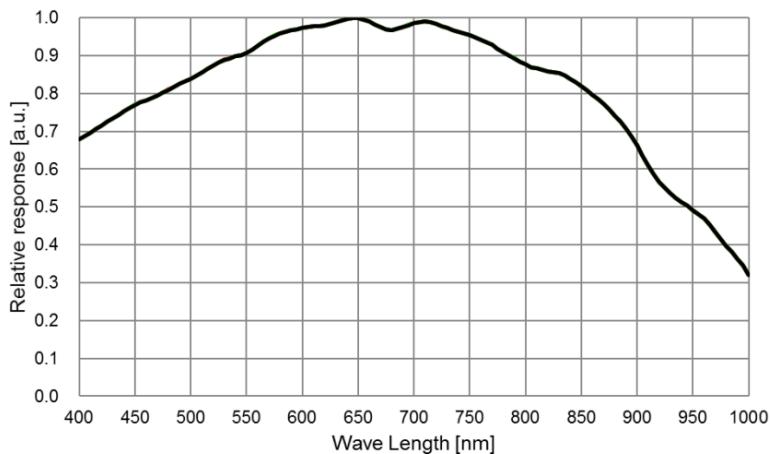


Figure 4-44 SCM687-M-TR spectral response curve

## 4.28 SCM676-C-TR

Table 4-28 SCM676-C-TR camera specifications

Parameter \ Model	SCM676-C-TR (IUA12000KPA20231019) 12.0Mpixels 1/1.6" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX676-AACR1-C
Pixel size	2.0 $\mu\text{m}$ x 2.0 $\mu\text{m}$
Sensor size	1/1.6"
Frame rate	27fps@3536 x3536, 60fps@1768 x 1768
Conversion Gain	HCG: 1.07 / LCG: 2.86(e-/ADU)
Readout Noise	HCG: 1.48 / LCG: 3.82(e-)
Full Well	HCG: 4.4 / LCG: 11.7(ke-)
Dynamic range	HCG: 69.24 / LCG: 69.8(dB)
Signal-to-Noise ratio	HCG: 36.4 / LCG: 40.7(dB)
Sensitivity	3637mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

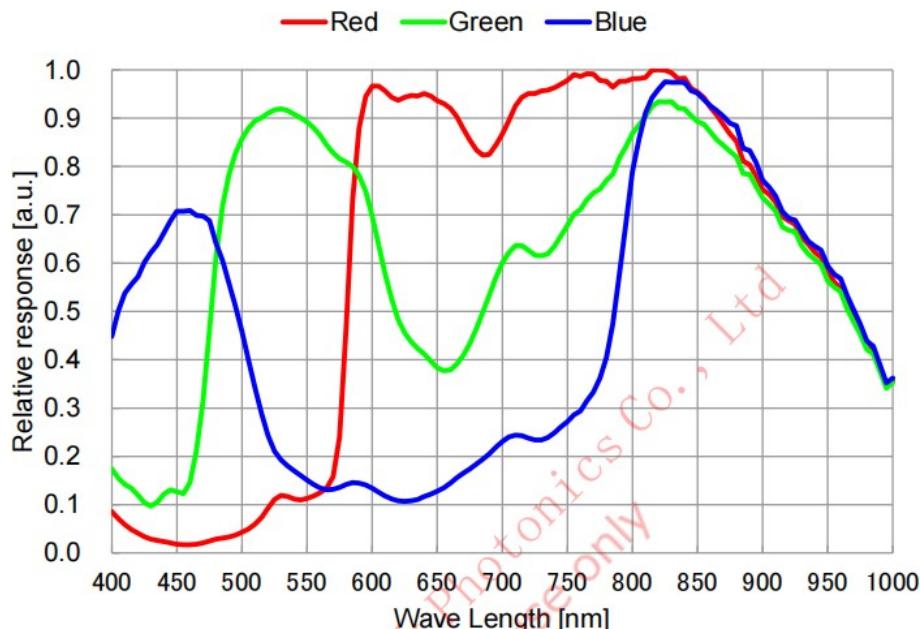


Figure 4-45 IUA12000KPA spectral response curve

## 4.29 SCM545-M-TR

Table 4-29 SCM545-M-TR camera specifications

Parameter \ Model	SCM545-M-TR (IUA12300KMA) 12.3Mpixels 1/1.1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX545-AAMJ-C
Pixel size	2.74 $\mu\text{m}$ x 2.74 $\mu\text{m}$
Sensor size	1/1.1"
Frame rate	28.2fps@4096 x3000, 100.9fps@2048 x 1500, 100.9fps@1024 x 750
Conversion Gain	2.35 (e-/ADU)
Readout Noise	2.19 (e-)
Full Well	9.6 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40 (dB)
Sensitivity	2252mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

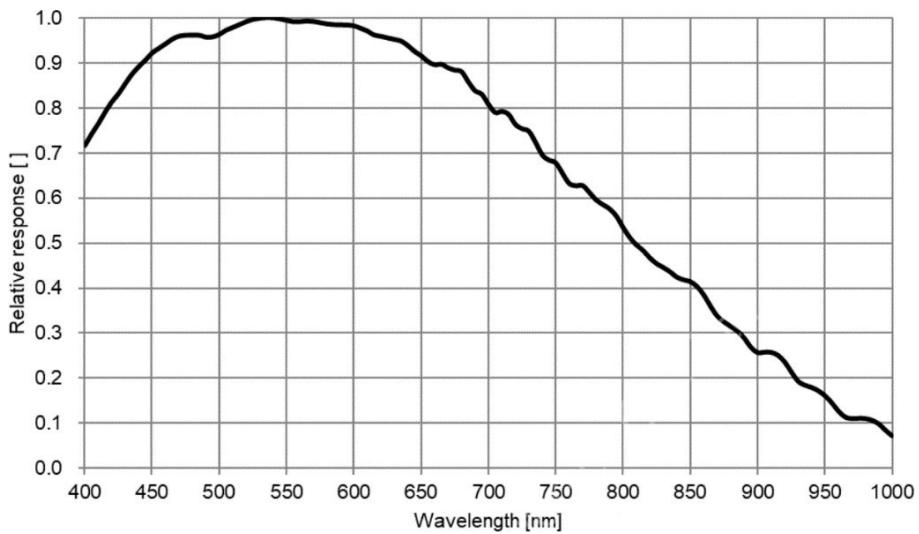


Figure 4-46 SCM545-M-TR spectral response curve

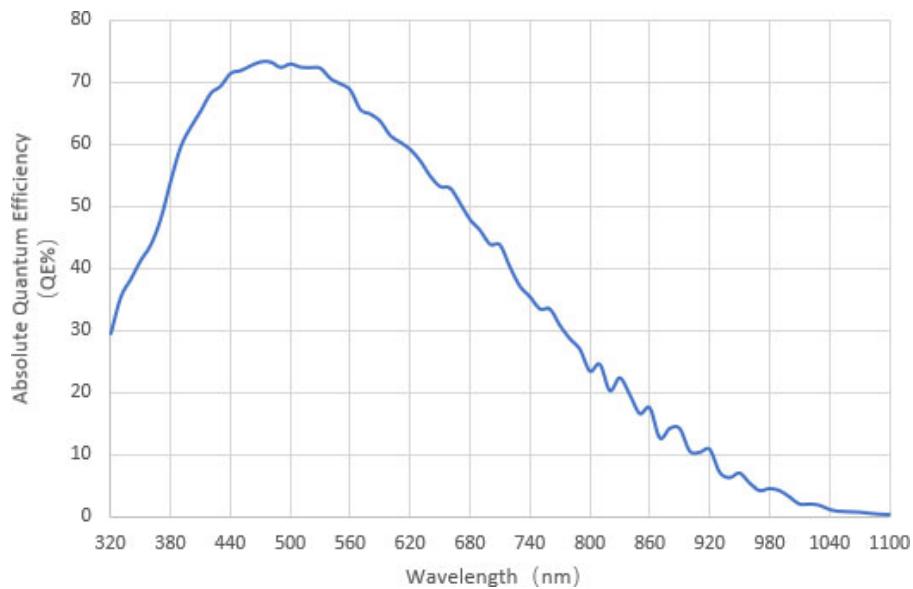


Figure 4-47 SCM545-M-TR absolute quantum efficiency

## 4.30 SCM545-C-TR

Table 4-30 SCM545-C-TR camera specifications

Parameter \ Model	SCM545-C-TR (IUA12300KPA)
<b>12.3Mpixels 1/1.1" CMOS USB3.0 industrial camera</b>	
Sensor model	Sony IMX545-AAQJ-C
Pixel size	2.74 $\mu\text{m}$ x 2.74 $\mu\text{m}$
Sensor size	1/1.1"
Frame rate	28.2fps@4096 x 3000, 100.9fps@2048 x 1500, 100.9fps@1024 x 750
Conversion Gain	2.44 (e-/ADU)
Readout Noise	2.22 (e-)
Full Well	10.0 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40 (dB)
Sensitivity	1337mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30 $\mu\text{s}$ -15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

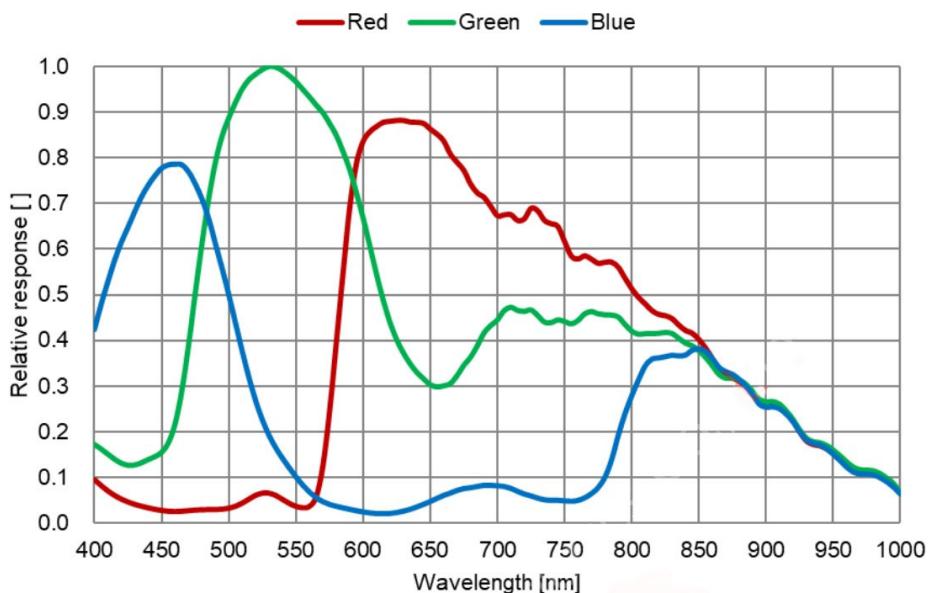


Figure 4-48 SCM545-C-TR spectral response curve

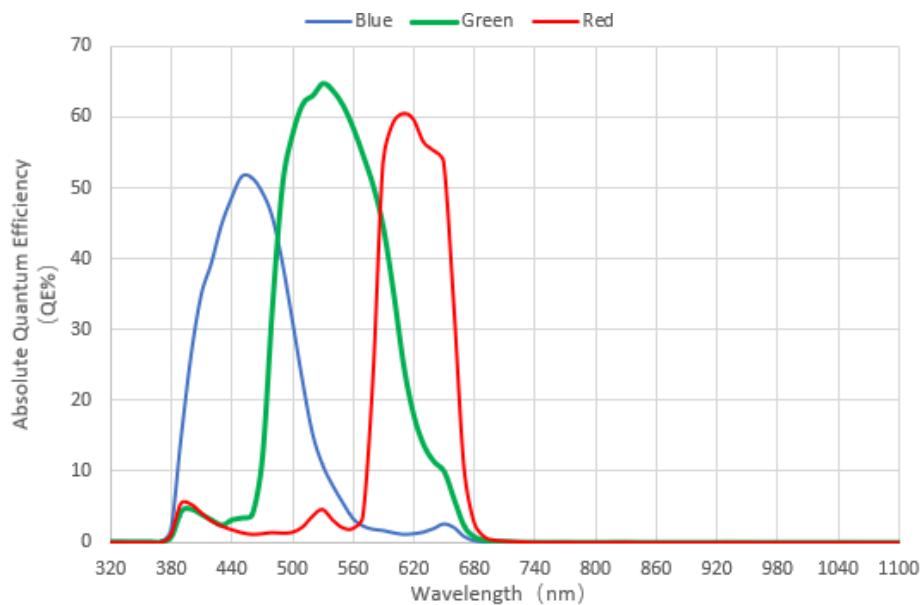


Figure 4-49 SCM545-C-TR absolute quantum efficiency

## 4.31 SCM304-M-TR

Table 4-31 SCM304-M-TR camera specifications

Parameter \ Model	SCM304-M-TR (IUA12300KMB) 12.3M pixels 1.1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX304LLR-C
Pixel size	3.45 μm x 3.45 μm
Sensor size	1.1"
Frame rate	23.4fps@4096 x3000, 46.3fps@2048 x 1500, 46.3fps@1024 x 750
Conversion Gain	2.71 (e-/ADU)
Readout Noise	2.12 (e-)
Full Well	11.1 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.5dB
Sensitivity	1830mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

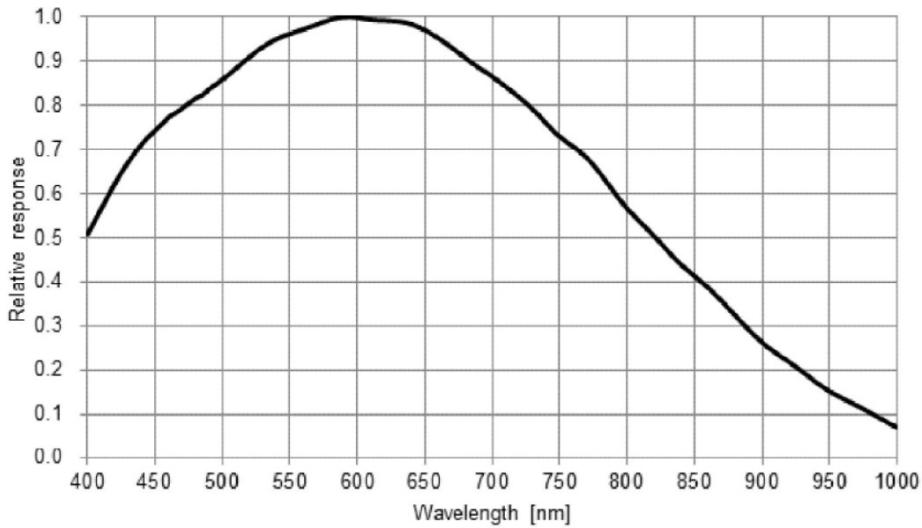


Figure 4-50 SCM304-M-TR spectral response curve

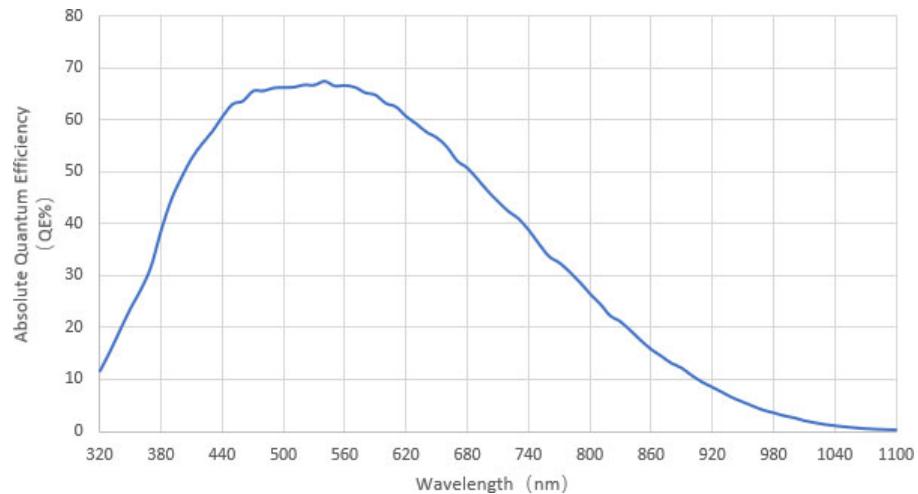


Figure 4-51 SCM304-M-TR absolute quantum efficiency

## 4.32 SCM304-C-TR

Table 4-32 SCM304-C-TR camera specifications

Parameter \ Model	SCM304-C-TR (IUA12300KPB) 12.3M pixels 1.1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX304LQR-C
Pixel size	3.45 μm x 3.45 μm
Sensor size	1.1"
Frame rate	23.4fps@4096 x 3000, 46.3fps@2048 x 1500, 46.3fps@1024 x 750
Conversion Gain	2.68 (e-/ADU)
Readout Noise	2.11 (e-)
Full Well	11.0 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	40.4dB
Sensitivity	1146mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

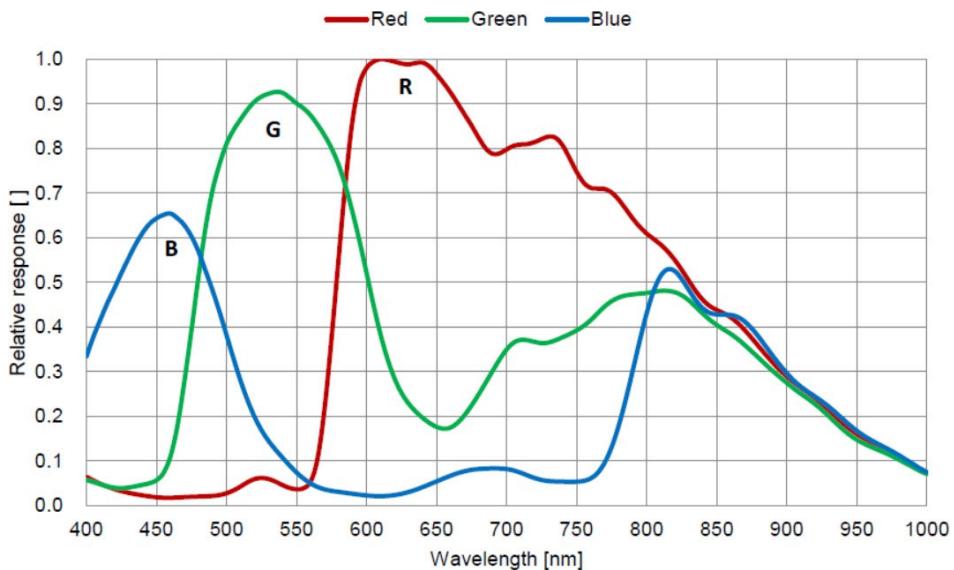


Figure 4-52 SCM304-C-TR spectral response curve

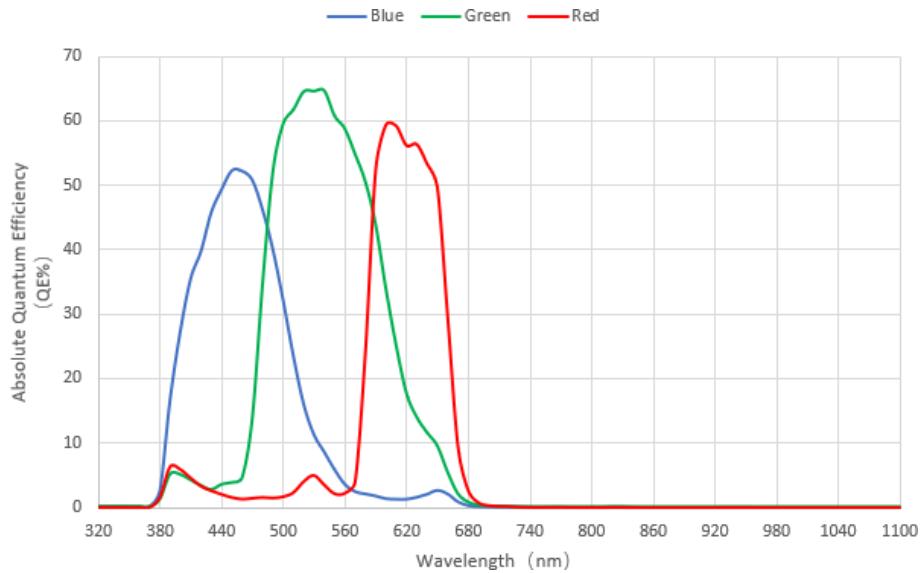


Figure 4-53 SCM304-C-TR absolute quantum efficiency

## 4.33 SCM183-M-TR

Table 4-33 SCM183-M-TR camera specifications

Parameter \ Model	SCM183-M-TR (IUA20000KMA)
20.0Mpixels 1" CMOS USB3.0 industrial camera Camera	
Sensor model	Sony IMX183CLK
Pixel size	2.4 $\mu\text{m}$ x 2.4 $\mu\text{m}$
Sensor size	1"
Frame rate	19.0fps@5440 x 3684, 49.9fps@2736 x 1824, 59.5fps@1824 x 1216
Conversion Gain	3.78 (e-/ADU)
Readout Noise	3.25 (e-)
Full Well	15.5 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	41.9dB
Sensitivity	777mV
Dark current	0.2mV
Gain range	1x-50x
Exposure time	53 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Hardware 2x2, 3x3; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.0W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

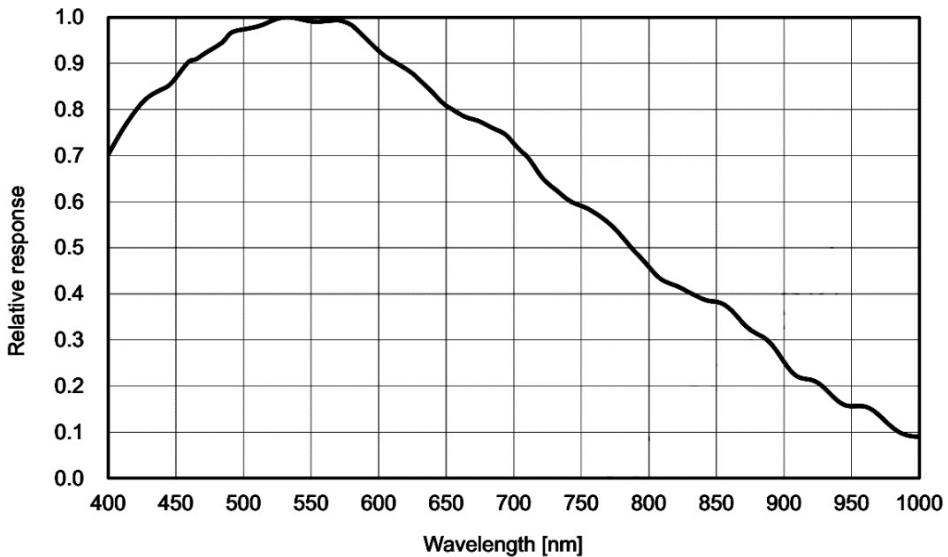


Figure 4-54 SCM183-M-TR spectral response curve

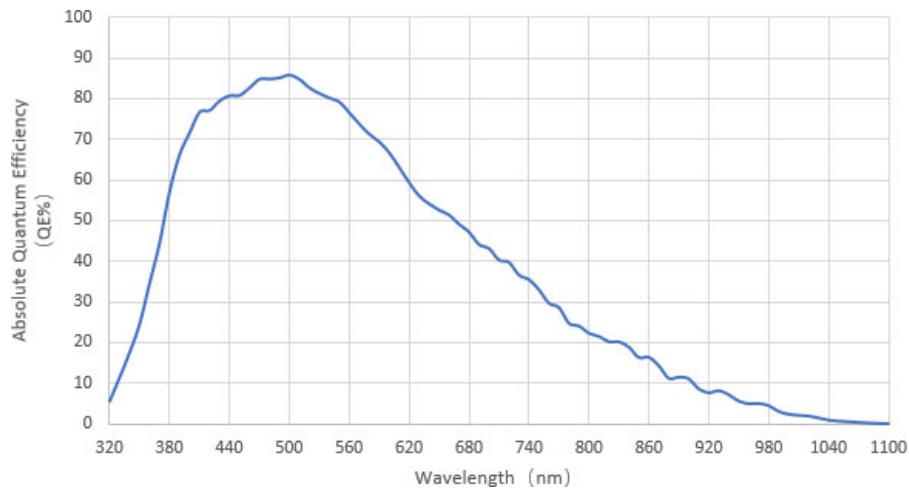


Figure 4-55 SCM183-M-TR absolute quantum efficiency

## 4.34 SCM183-C-TR

Table 4-34 SCM183-C-TR camera specifications

Parameter \ Model	SCM183-C-TR (IUA20000KPA) 20.0M pixels 1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX183CQK
Pixel size	2.4 $\mu\text{m}$ x 2.4 $\mu\text{m}$
Sensor size	1"
Frame rate	19.0fps@5440 x 3684, 48.8fps@2736 x 1824, 59.4fps@1824 x 1216
Conversion Gain	3.73 (e-/ADU)
Readout Noise	3.14 (e-)
Full Well	15.3 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	41.8dB
Sensitivity	462mV
Dark current	0.2mV
Gain range	1x-50x
Exposure time	53 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Hardware 2x2, 3x3; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.5W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

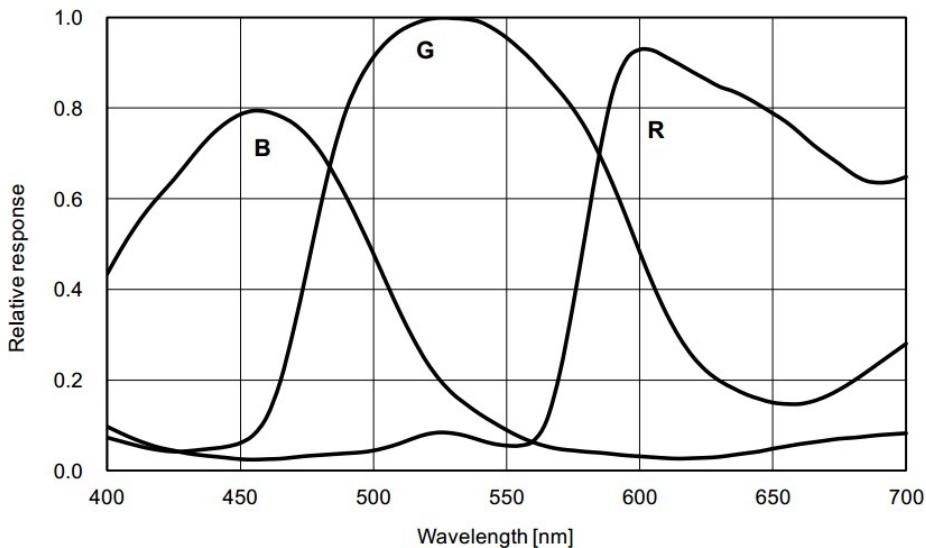


Figure 4-56 SCM183-C-TR spectral response curve

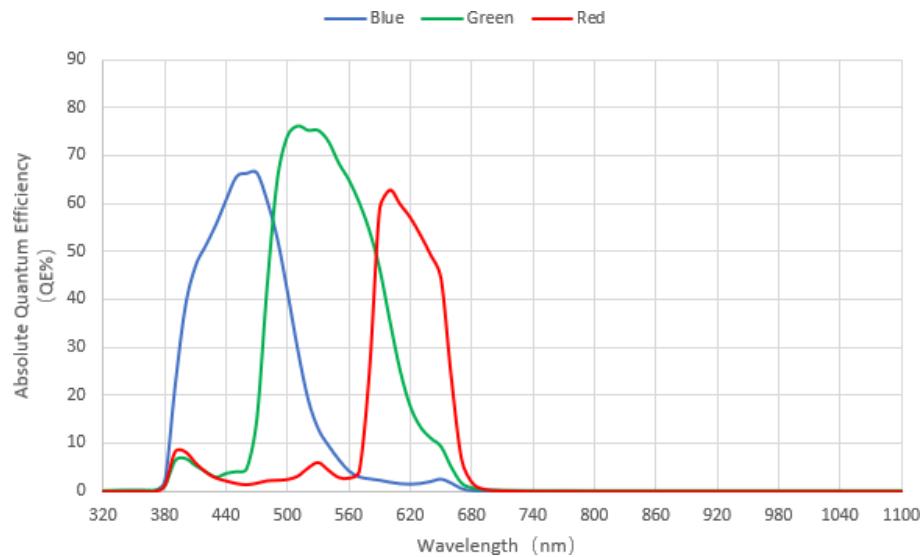


Figure 4-57 SCM183-C-TR absolute quantum efficiency

## 4.35 SCM541-M-TR

Table 4-35 SCM541-M-TR camera specifications

Parameter \ Model	SCM541-M-TR (IUA20400KMA) 20.4M pixels 1.1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX541-AAMJ-C
Pixel size	2.74 μm x 2.74 μm
Sensor size	1.1"
Frame rate	17.5fps@4496 × 4496, 64.4fps@2240 × 2240, 64.4fps@1120 × 1120
Conversion Gain	2.35 (e-/ADU)
Readout Noise	2.19 (e-)
Full Well	9.6 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Peak QE	86%@520nm
Sensitivity	2649mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

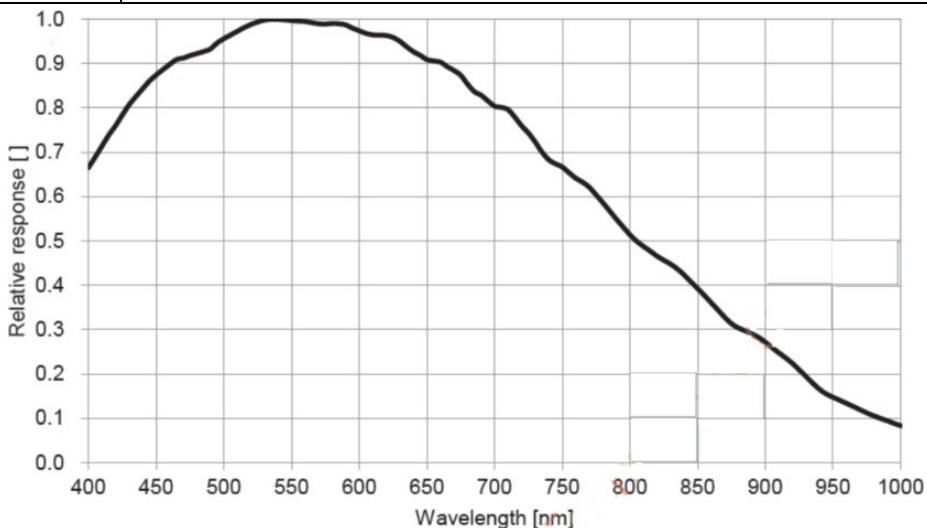


Figure 4-58 SCM541-M-TR spectral response curve

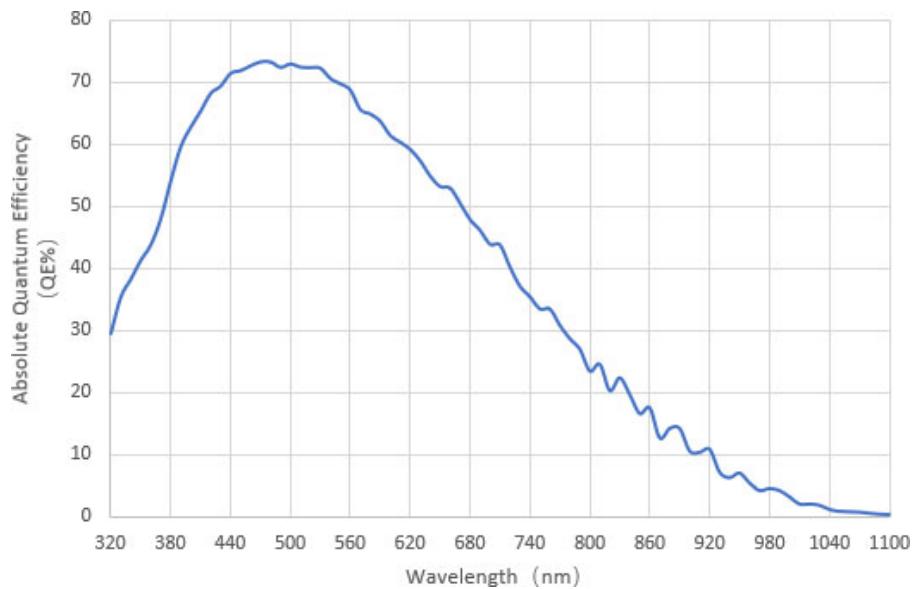


Figure 4-59 SCM541-M-TR absolute quantum efficiency

## 4.36 SCM541-C-TR

Table 4-36 SCM541-C-TR camera specifications

Parameter \ Model	SCM541-C-TR (IUA20400KPA) 20.4M pixels 1.1" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX541-AAQJ-C
Pixel size	2.74 μm x 2.74 μm
Sensor size	1.1"
Frame rate	17.5fps@4496 × 4496, 64.4fps@2240 × 2240, 64.4fps@1120 × 1120
Conversion Gain	2.44 (e-/ADU)
Readout Noise	2.22 (e-)
Full Well	10.0 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Sensitivity	1574mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.2W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

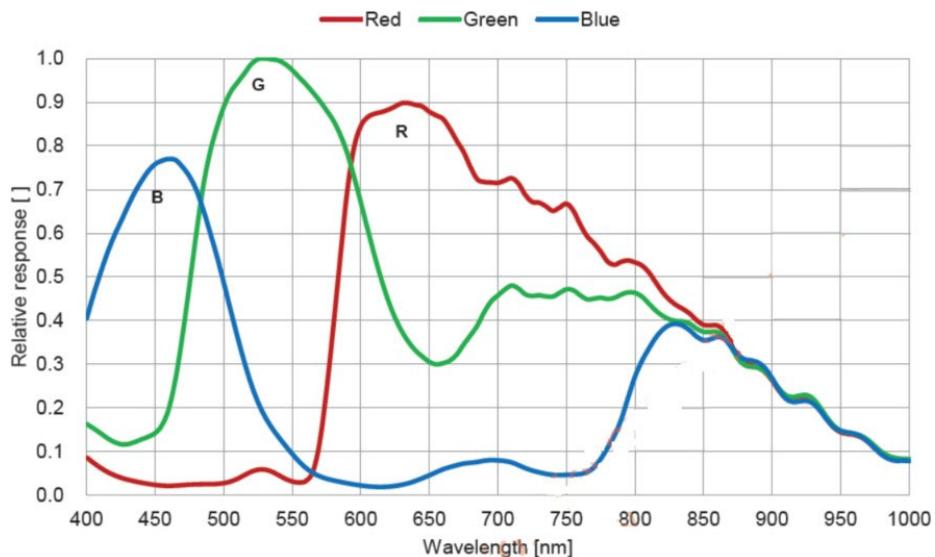


Figure 4-60 SCM541-C-TR spectral response curve

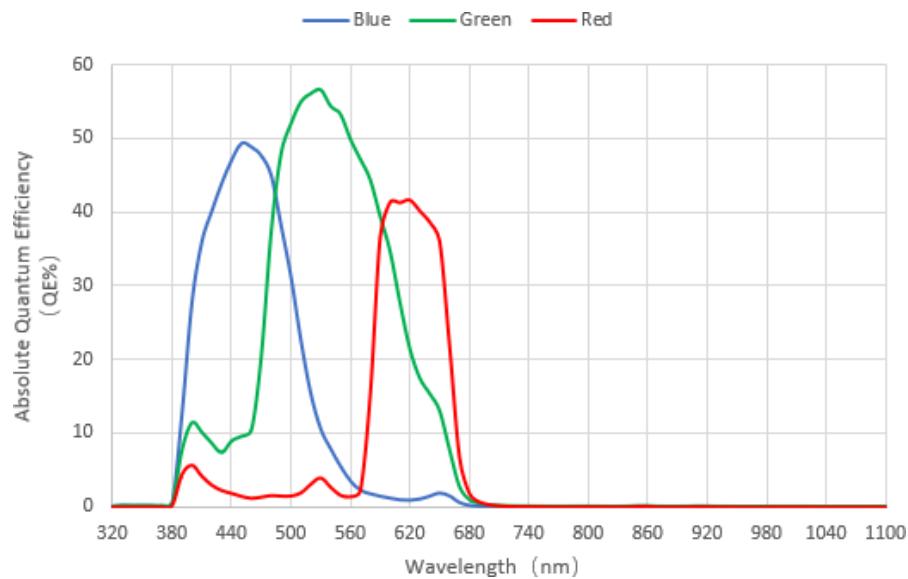


Figure 4-61 SCM541-C-TR absolute quantum efficiency

## 4.37 SCM540-M-TR

Table 4-37 SCM540-M-TR camera specifications

Parameter \ Model	SCM540-M-TR (IUA24500KMA) 24.5M pixels 1.2" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX540-AAMJ-C
Pixel size	2.74 μm x 2.74 μm
Sensor size	1.2"
Frame rate	<a href="#">14.7fps@5320×4600</a> , 54.3fps@2660×2300
Conversion Gain	2.35 (e-/ADU)
Readout Noise	2.19 (e-)
Full Well	9.6 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Peak QE	2649mV
Sensitivity	0.15mV
Dark current	1-50 倍
Gain range	30μs-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	TBD
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

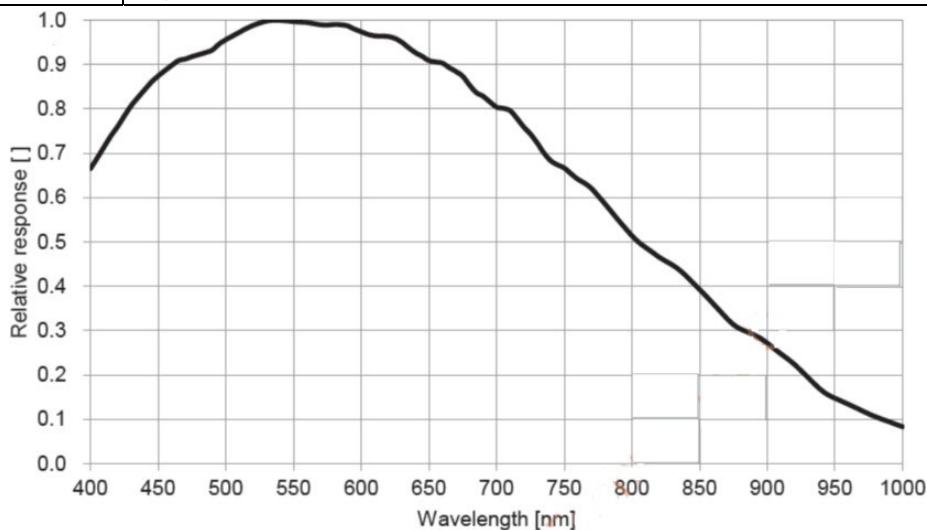


Figure 4-62 SCM540-M-TR spectral response curve

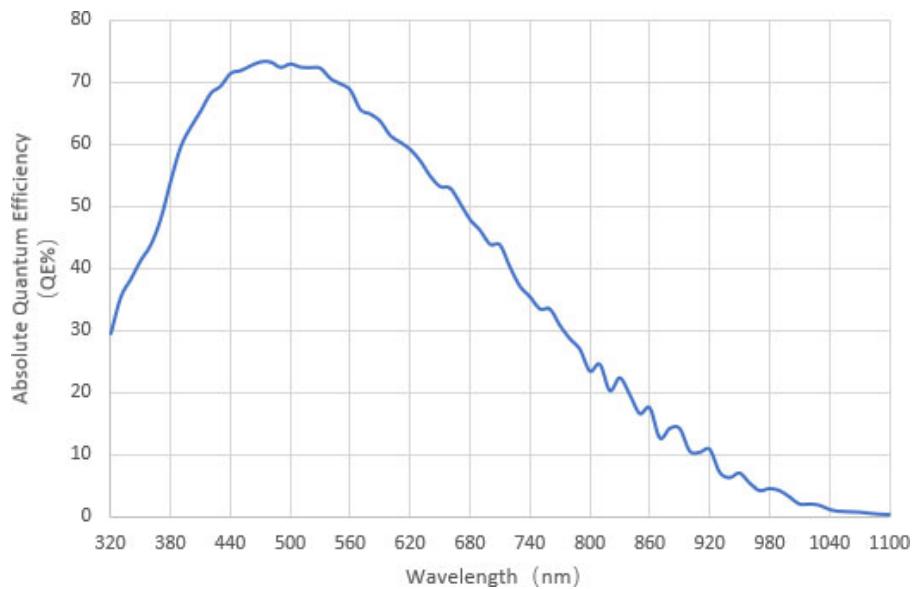


Figure 4-63 SCM540-M-TR absolute quantum efficiency

## 4.38 SCM540-C-TR

Table 4-38 SCM540-C-TR camera specifications

Parameter \ Model	SCM540-C-TR (IUA24500KPA) 24.5M pixels 1.2" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX540-AAQJ-C
Pixel size	2.74 μm x 2.74 μm
Sensor size	1.2"
Frame rate	14.7fps@5320×4600, 54.3fps@2660×2300
Conversion Gain	2.44 (e-/ADU)
Readout Noise	2.22 (e-)
Full Well	10.0 (ke-)
Dynamic range	72.0dB
Signal-to-Noise ratio	40.0dB
Sensitivity	1574mV
Dark current	0.15mV
Gain range	1-50 倍
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	TBD
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

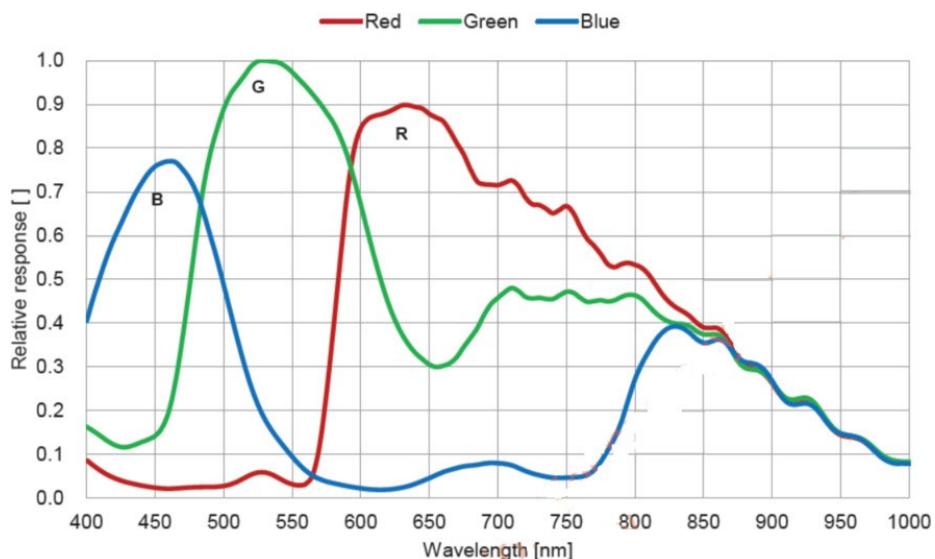


Figure 4-64 SCM540-C-TR spectral response curve

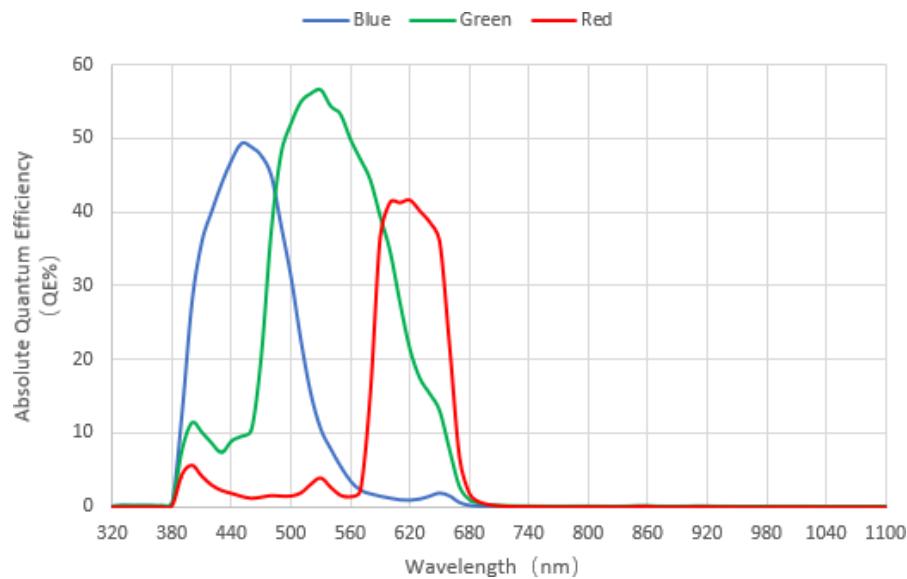


Figure 4-65 SCM540-C-TR absolute quantum efficiency

## 4.39 SCM0505-C-TR

Table 4-39 SCM0505-C-TR camera specifications

Parameter \ Model	SCM0505-C-TR (IUA25000KMA)
Parameter	25.0M 1.1" CMOS USB3.0 industrial camera
	Camera
Sensor model	GMAX0505
Pixel size	2.5 μm x 2.5 μm
Sensor size	1.1"
Frame rate	13@5120x5120, 27@2560x2560, 54@1280x1280
Conversion Gain	1.37 (e-/ADU)
Readout Noise	2.9 (e-)
Full Well	5.59(ke-)
Dynamic range	65.7dB
Signal-to-Noise ratio	37.5dB
Peak QE	65.5%@500nm
Dark current	2.4 e-/pixel/s @ 25 room temperature
Gain range	1x-5x
Exposure time	0.15ms-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data format	8bit / 12bit
	General specification
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.5W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

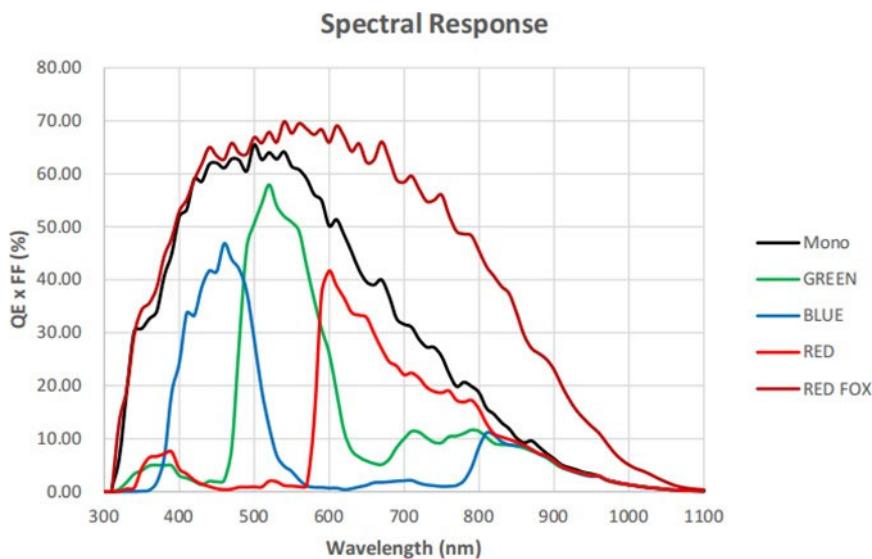


Figure 4-66 SCM0505-C-TR spectral response curve

## 4.40 SCM0505-C-TR

Table 4-40 SCM0505-C-TR camera specifications

Parameter \ Model	SCM0505-C-TR (IUA25000KPA)
<b>25.0M 1.1" CMOS USB3.0 industrial camera</b>	
<b>Camera</b>	
Sensor model	GMAX0505
Pixel size	2.5 μm x 2.5 μm
Sensor size	1.1"
Frame rate	13@5120x5120, 27@2560x2560, 54@1280x1280
Conversion Gain	1.37 (e-/ADU)
Readout Noise	2.9 (e-)
Full Well	5.59(ke-)
Dynamic range	65.7dB
Signal-to-Noise ratio	37.5dB
Peak QE	65.5%@500nm
Dark current	2.4 e-/pixel/s @ 25 room temperature
Gain range	1x-5x
Exposure time	0.15ms-15sec
Shutter	Global shutter
Binning	Hardware 2x2, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data format	8bit / 12bit
<b>General specification</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.95W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

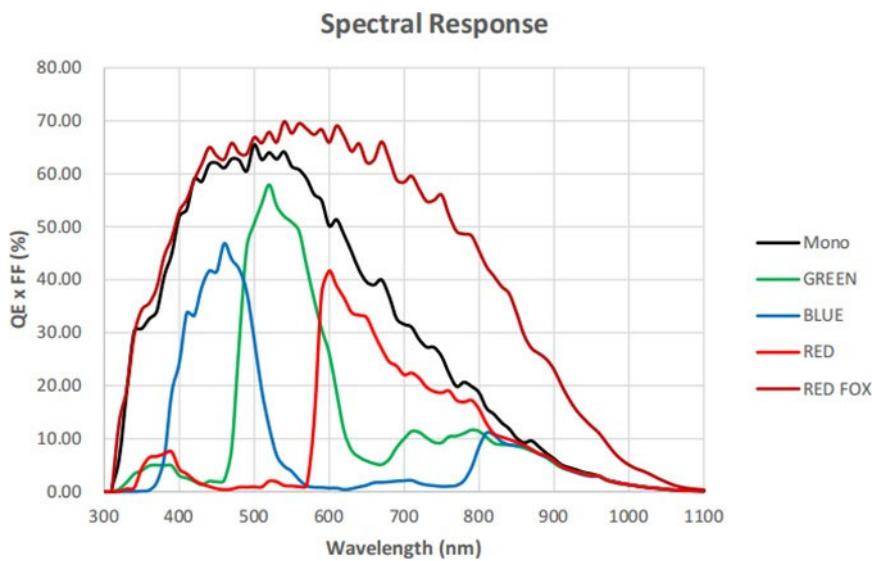


Figure 4-67 SCM0505-C-TR spectral response curve

## 4.41 SCM492-M-TR

Table 4-41 SCM492-M-TR camera specifications

Parameter \ Model	SCM492-M-TR (IUA45000KMA) 45.0M4/3" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX492LLJ-C
Pixel size	2.315 μm x 2.315μm
Sensor size	4/3"
Frame rate	8.1@8176x5616(3:2), 30.0@4080x2808(3:2) 8.1@7408x5556(4:3), 33.0@3696x2778(4:3) 10.4@8176x4320(17:9), 34.7@4096x2160(17:9), 62.5@2048x1080(17:9), 86.5@1360x720(17:9)
Conversion Gain	3.59 (e-/ADU)
Readout Noise	2.70 (e-)
Full Well	14.7 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	41.7dB
Sensitivity	176mV
Dark current	0.03mV
Gain range	1x-50x
Exposure time	0.1ms-15sec
Shutter	Rolling shutter
Binning	Hardware 2x2, 3x3, 4x4; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.1W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	214g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

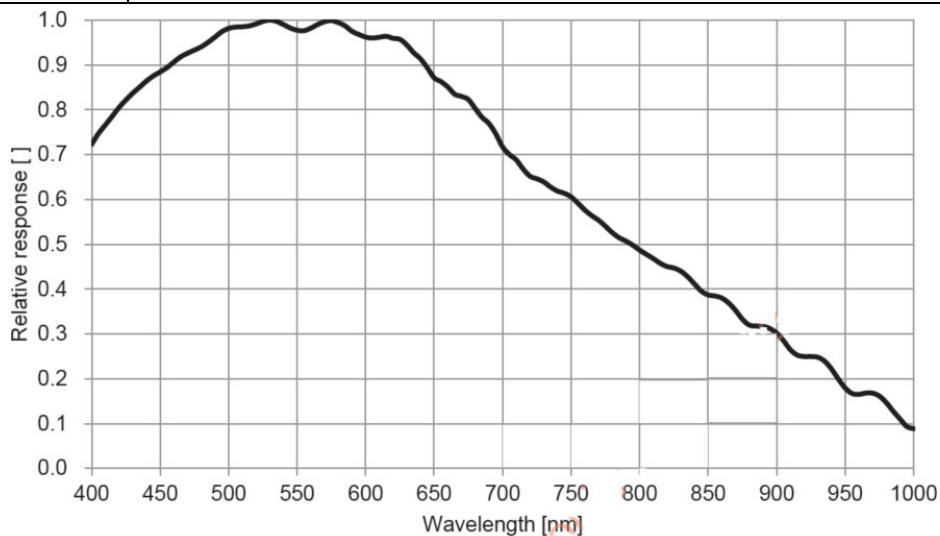


Figure 4-68 SCM492-M-TR spectral response curve

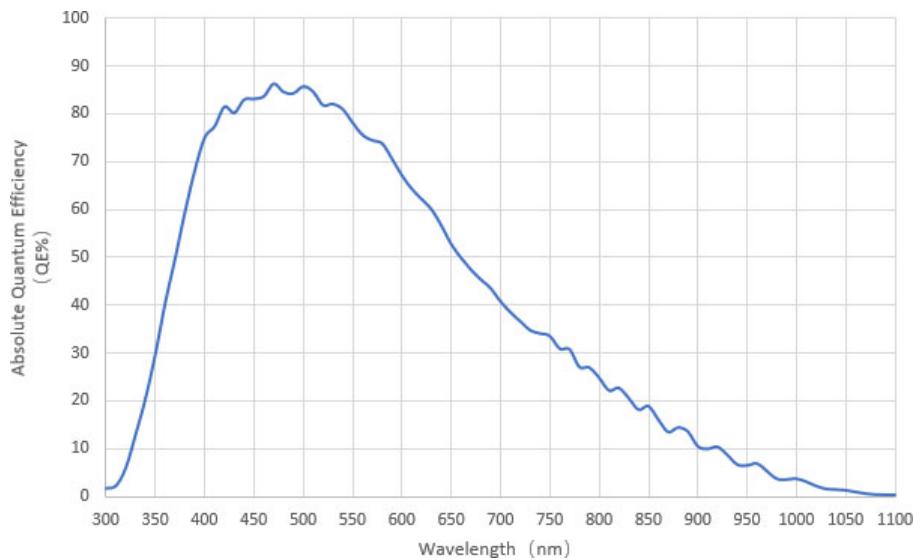


Figure 4-69 SCM492-M-TR absolute quantum efficiency

## 4.42 SCM462-CNIR-TR

Table 4-42 SCM462-CNIR-TR camera specifications

Parameter \ Model	SCM462-CNIR-TR (IUA2100KPA) 2.1M pixels 1/2.8" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX462LQR
Pixel size	2.9 $\mu\text{m}$ x 2.9 $\mu\text{m}$
Sensor size	1/2.8"
Frame rate	120.3fps@1920 x 1080
Conversion Gain	HCG: 4.71 / LCG: 12.29 (e-/ADU)
Readout Noise	HCG: 3.49 / LCG: 12.35 (e-)
Full Well	HCG: 19.3 / LCG: 50.4 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	HCG: 42.8 / LCG: 47.0 (dB)
Sensitivity	2376mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	11 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Software2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.9W
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

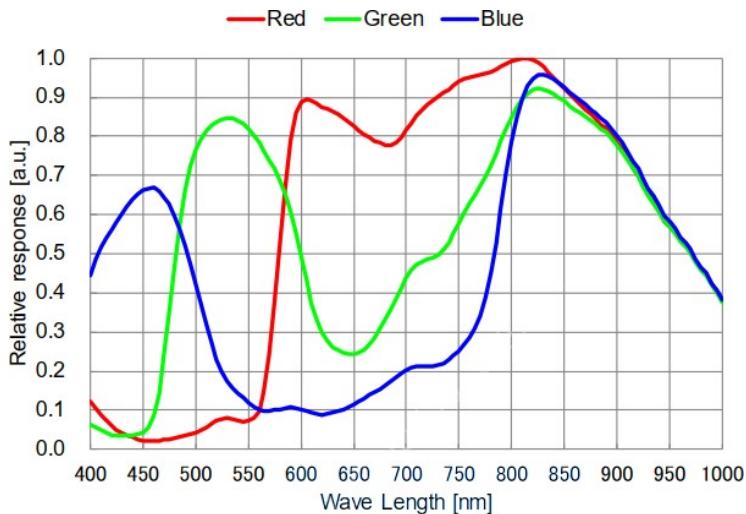


Figure 4-70 SCM462-CNIR-TR spectral response curve

## 4.43 SCM464-CNIR-TR

Table 4-43 SCM464-CNIR-TR camera specifications

Parameter \ Model	SCM464-CNIR-TR (IUA4100KPA) 4.1M pixels 1/1.8" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX464LQR
Pixel size	2.9 $\mu\text{m}$ x 2.9 $\mu\text{m}$
Sensor size	1/1.8"
Frame rate	90fps@2688 x 1520
Conversion Gain	HCG: 4.71 / LCG: 12.29 (e-/ADU)
Readout Noise	HCG: 3.49 / LCG: 12.35 (e-)
Full Well	HCG: 19.3 / LCG: 50.4 (ke-)
Dynamic range	72dB
Signal-to-Noise ratio	HCG: 42.8 / LCG: 47.0 (dB)
Sensitivity	2376mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	11 $\mu\text{s}$ -15sec
Shutter	Rolling shutter
Binning	Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<1.9W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	228g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

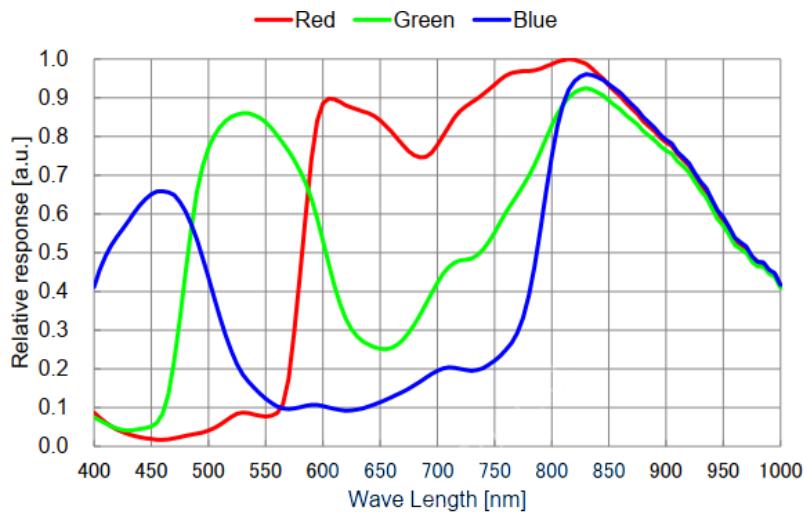


Figure 4-71 SCM464-CNIR-TR spectral response curve

## 4.44 SCA1605-UV-TR(GPixel UV)

Table 4-44 SCA1605-UV-TR camera specifications

Parameter \ Model	SCA1605-UV-TR (IUA500KMA) 0.5M pixels 1" CMOS USB3.0 industrial camera Camera
Sensor model	GPixel GLUX1605BSI (UV)
Pixel size	16 μm x 16 μm
Sensor size	1"
Frame rate	60fps@800 x 600, 60fps@400 x 300
Conversion Gain	HCG: 0.83 / LCG: 5.23 / HDR: 0.70 (e-/ADU)
Readout Noise	HCG: 6.19 / LCG: 37.48 / HDR: 2.80 (e-)
Full Well	HCG: 13.5 / LCG: 85.7 / HDR: 46.0 (ke-)
Dynamic range	HCG: 66.5 / LCG: 67.0 / HDR: 84.0 (dB)
Signal-to-Noise ratio	HCG: 41.3 / LCG: 49.3 / HDR: 46.6 (dB)
Peak QE	89%@610nm
Sensitivity	6.4x10 <sup>8</sup> e-/(W/m <sup>2</sup> ).s))
Dark current	50(e-/s/pix)
Gain range	1x-8x
Exposure time	27μs-60sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit / HDR16
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	270g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

### Spectral response

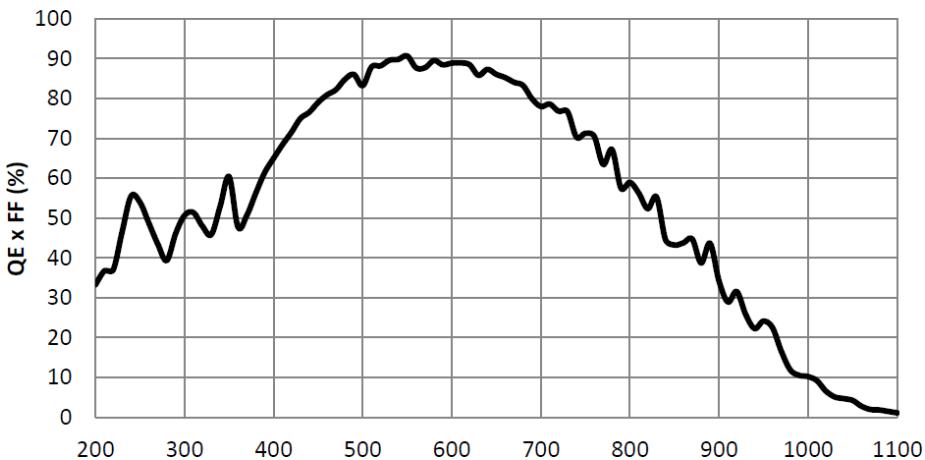


Figure 4-72 SCM264-M-TR spectral response curve

## 4.45 SCA9701-UV-TR(GPixel UV)

Table 4-45 SCA9701-UV-TR camera specifications

Parameter \ Model	SCA9701-UV-TR (IUA1300KMA) 1.3M pixels 1" CMOS USB3.0 industrial camera Camera
Sensor model	GPixel GLUX9701BSI (UV)
Pixel size	9.76 μm x 9.76 μm
Sensor size	1"
Frame rate	30fps@1280 x 1024, 30fps@640 x 512
Conversion Gain	HCG: 3.22 / LCG: 21.6 / HDR: 0.29 (e-/ADU)
Readout Noise	HCG: 5.47 / LCG: 35.87 / HDR: 1.88 (e-)
Full Well	HCG: 13.2 / LCG: 88.5 / HDR: 19.1 (ke-)
Dynamic range	HCG: 67.4 / LCG: 67.6 / HDR: 79.9 (dB)
Signal-to-Noise ratio	HCG: 41.2 / LCG: 49.5 / HDR: 42.8 (dB)
Peak QE	$2.57 \times 10^8$ (e-/(W/m <sup>2</sup> ).s))
Sensitivity	89%@610nm
Dark current	11e- / s/pix
Gain range	1x-8x
Exposure time	63μs-60sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit / HDR16
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	270g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

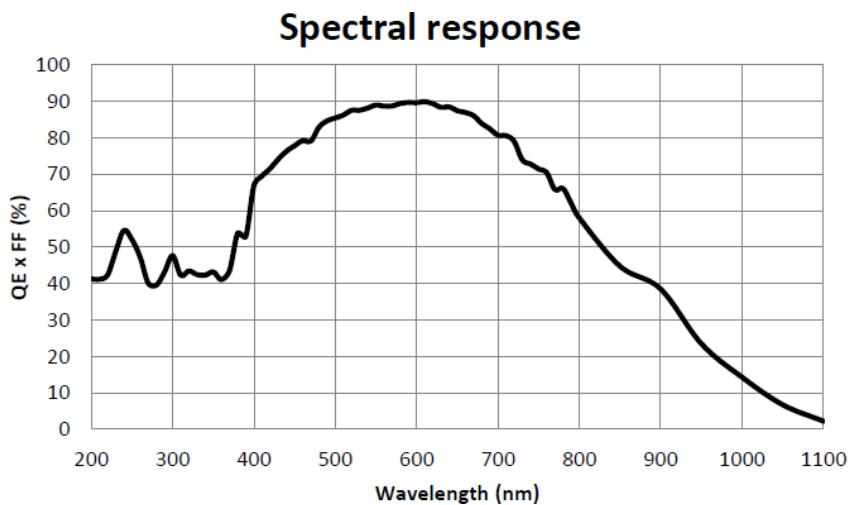


Figure 4-73 SCA9701-UV-TR spectral response curve

## 4.46 SCA2020-ME(GPixel NIR)

Table 4-46 SCA2020-ME camera specifications

Parameter \ Model	SCA2020-ME (IUA4200KMA) 4.2Mpixels 1.2" CMOS USB3.0 industrial camera Camera
Sensor model	GPixel GSENSE2020e (NIR)
Pixel size	6.5 μm x 6.5 μm
Sensor size	1.2"
Frame rate	45fps@2048 x 2048, 45fps@1024 x 1024
Conversion Gain	HCG: 0.83 / LCG: 5.23 / HDR: 0.70 (e-/ADU)
Readout Noise	HCG: 6.19 / LCG: 37.48 / HDR: 2.80 (e-)
Full Well	HCG: 13.5 / LCG: 85.7 / HDR: 46.0 (ke-)
Dynamic range	HCG: 66.5 / LCG: 67.0 / HDR: 84.0 (dB)
Signal-to-Noise ratio	HCG: 41.3 / LCG: 49.3 / HDR: 46.6 (dB)
Peak QE	8.1x10 <sup>7</sup> (e-/(W/m <sup>2</sup> ).s))
Sensitivity	73%@595nm
Dark current	13e-·s/pix
Gain range	1x-8x
Exposure time	21μs-60sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit / HDR16
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	270g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

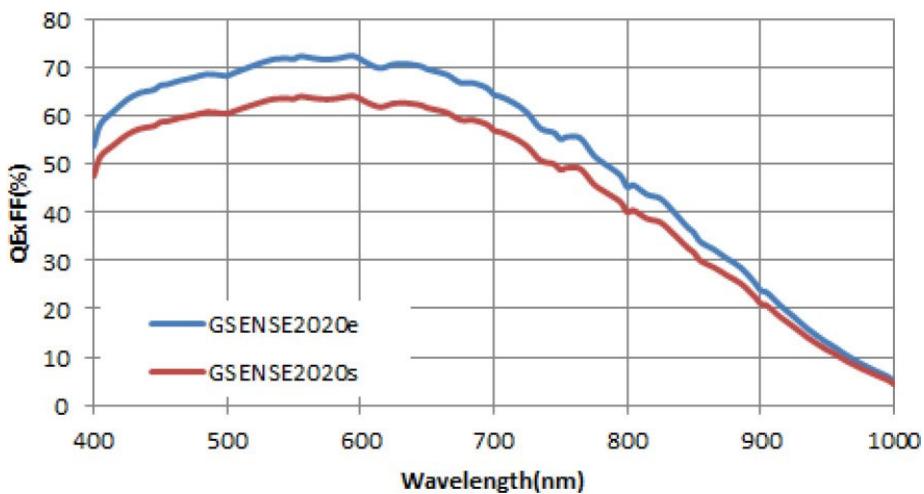


Figure 4-74 SCA2020-ME spectral response curve

## 4.47 SCA2020-UV-TR(GPixel UV)

Table 4-47 SCA2020-UV-TR camera specifications

Parameter \ Model	SCA2020-UV-TR (IUA4200KMB) 4.2M pixels 1.2" CMOS USB3.0 industrial camera Camera
Sensor model	GPixel GSENSE2020BSI -H (UV)
Pixel size	6.5 μm x 6.5 μm
Sensor size	1.2"
Frame rate	32fps@2048 x 2048, 32fps@1024 x 1024
Conversion Gain	HCG: 2.69 / LCG: 15.49 / HDR:0.55 (e-/ADU)
Readout Noise	HCG:5.4 / LCG:21.02 / HDR:2.89 (e-)
Full Well	HCG: 12.1 / LCG: 46.4 / HDR:35.8 (ke-)
Dynamic range	HCG: 66.8 / LCG: 66.7 / HDR: 81.6 (dB)
Signal-to-Noise ratio	HCG: 40.8 / LCG: 46.7 / HDR: 45.5 (dB)
Peak QE	1.1x10 <sup>8</sup> (e-/(W/m <sup>2</sup> ).s))
Sensitivity	93.7%@550nm
Dark current	80e-./s/pix
Gain range	1x-8x
Exposure time	21μs-60sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit / HDR16
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	270g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

Spectral Response

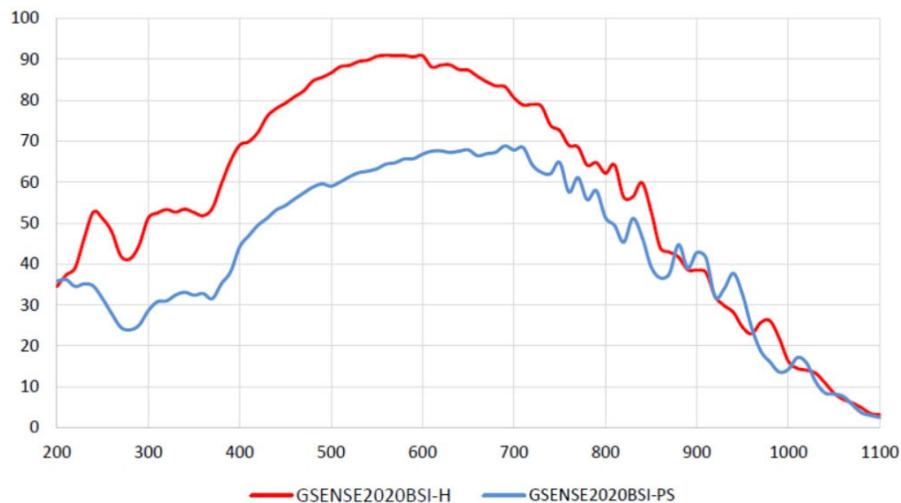


Figure 4-75 SCA2020-UV-TR spectral response curve

## 4.48 SCA400-UV-TR(GPixel UV)

Table 4-48 SCA400-UV-TR camera specifications

Parameter \ Model	SCA400-UV-TR (IUA4200KME) 4.2M pixels 2.0" CMOS USB3.0 industrial camera Camera
Sensor model	GPixel GSENSE400BSI (UV)
Pixel size	11 μm x 11 μm
Sensor size	2.0"
Frame rate	37fps@2048 x 2048, 37fps@1024 x 1024
Conversion Gain	HCG: 2.33 / LCG: 19.93 (e-/ADU)
Readout Noise	HCG: 3.57 / LCG: 31.26 (e-)
Full Well	HCG: 46.4 / LCG: 35.8 (ke-)
Dynamic range	HCG: 68.3 / LCG: 68.1 (dB)
Signal-to-Noise ratio	HCG: 39.8 / LCG: 49.1 (dB)
Sensitivity	$3.25 \times 10^8 (\text{e-} / ((\text{W}/\text{m}^2).\text{s}))$
Dark current	345e-/s/pix
Gain range	1x-8x
Exposure time	21μs-60sec
Shutter	Rolling shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<2.3W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	270g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC, RoHS

### Spectral Response

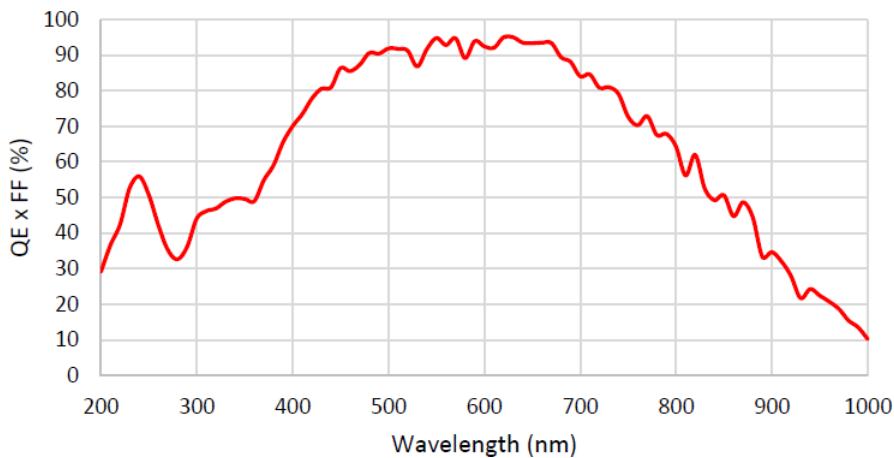


Figure 4-76 SCA400-UV-TR spectral response curve

## 4.49 SCM487-UV-TR(GS-UV)

Table 4-49 SCM487-UV-TR camera specifications

Parameter \ Model	SCM487-UV-TR (IUA8000KMA) 8.0M pixels 2/3" CMOS USB3.0 industrial camera Camera
Sensor model	Sony IMX487-AAMJ-C
Pixel size	2.74 μm x 2.74 μm
Sensor size	2/3"
Frame rate	45fps@2840 × 2840, 198fps@1420 × 1420
Conversion Gain	2.42 (e-/ADU)
Readout Noise	2.66 (e-)
Full Well	9.9 (ke-)
Dynamic range	71.2dB
Signal-to-Noise ratio	40.0dB
Peak QE	51%@500nm
Sensitivity	145mV
Dark current	0.15mV
Gain range	1x-50x
Exposure time	30μs-15sec
Shutter	Global shutter
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4
Data interface	USB3.0 (USB3.1 GEN1)
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0/ DC12V
Power consumption	<3.8W
Temperature	Working temperature -10~50°C, storage temperature-30~70°C
Humidity	20%-80%, no condensation
Size	68mmx68mmx28.1mm
Weight	227g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

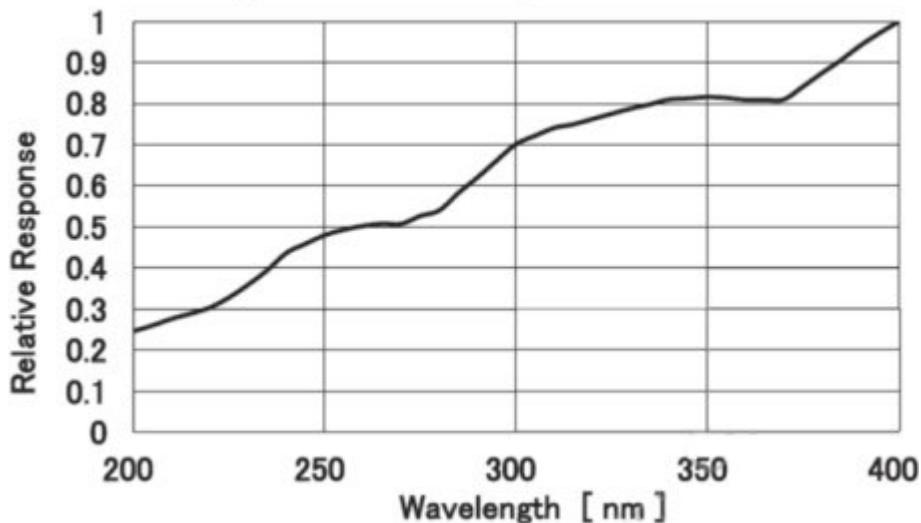
**Spectral sensitivity characteristics**

Figure 4-77 SCM487-UV-TR spectral response curve

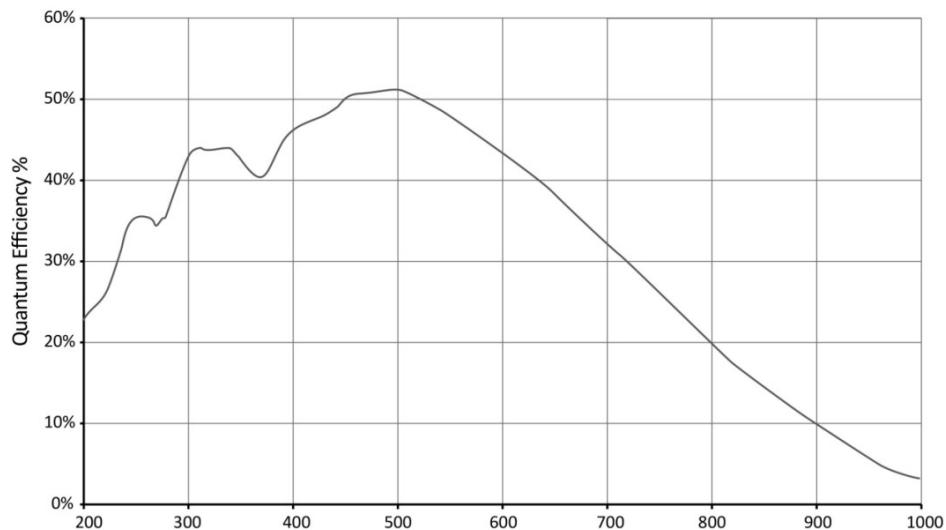


Figure 4-78 SCM487-UV-TR absolute quantum efficiency

## 5 IUC Series Technical Specifications

### 6.1 SCC410-C-TR(20231019)

Table 6-1 SCC410-C-TR camera specifications

Parameter	Model	SCC410-C-TR (IUC24000KPA)
	24.0M pixels 2.7"(Full Frame) CMOS USB3.0 industrial camera	
		Camera
Sensor model	Sony IMX410CQK-C	
Pixel size	5.94 μm x 5.94 μm	
Sensor size	2.7"(Full Frame)	
Frame rate	15.3fps@6064x4040 (14bit)、41fps@3024x2012、114fps@2016x1342	
Dynamic range	TBD	
Signal-to-Noise ratio	TBD	
Sensitivity	572.8mv	
Dark current	0.037mv	
Gain range	1-50 倍	
Exposure time	150us-15sec	
Shutter	Rolling shutter	
Binning	Hardware 2x2, 3x3; Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 14bit	
		General Specifications
Power supply	12V Power adapter	
Power consumption	<5.0W	
Temperature	Working temperature-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	540g	
Lens mount	M42 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

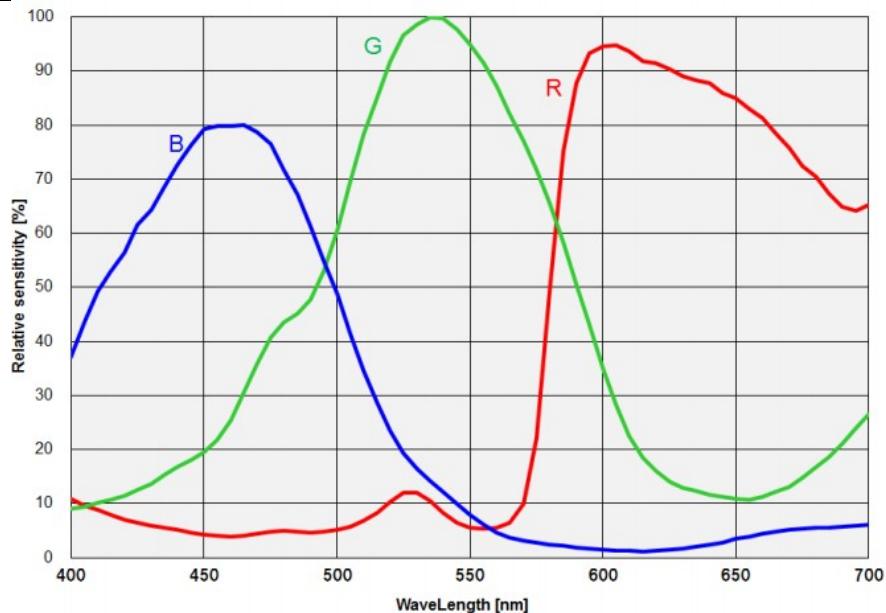


Figure 6-1 SCC410-C-TR spectral response curve

## 6.2 SCC571-M-TR

Table 6-2 SCC571-M-TR camera specifications

Parameter	Model	SCC571-M-TR (IUC26000KMA)
	26.0Mpixels 1.8"(APS-C)CMOS USB3.0 industrial camera	
Camera		
Sensor model	Sony IMX571BLR-J	
Pixel size	3.76 μm x 3.76 μm	
Sensor size	1.8"(APS-C)	
Frame rate	14fps@6224 x 4168(16bit), 37fps@3104 x 2084, 110fps@2064 x 1388	
Dynamic range	86.8dB	
Signal-to-Noise ratio	47.1dB	
Sensitivity	870.9mv	
Dark current	0.07mv	
Gain range	1x-50x	
Exposure time	150us-15sec	
Shutter	Rolling shutter	
Binning	Hardware 2x2, 3x3; Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 16bit	
General Specifications		
Power supply	12V Power adapter	
Power consumption	<5.0W	
Temperature	Working temperature-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	540g	
Lens mount	M42 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

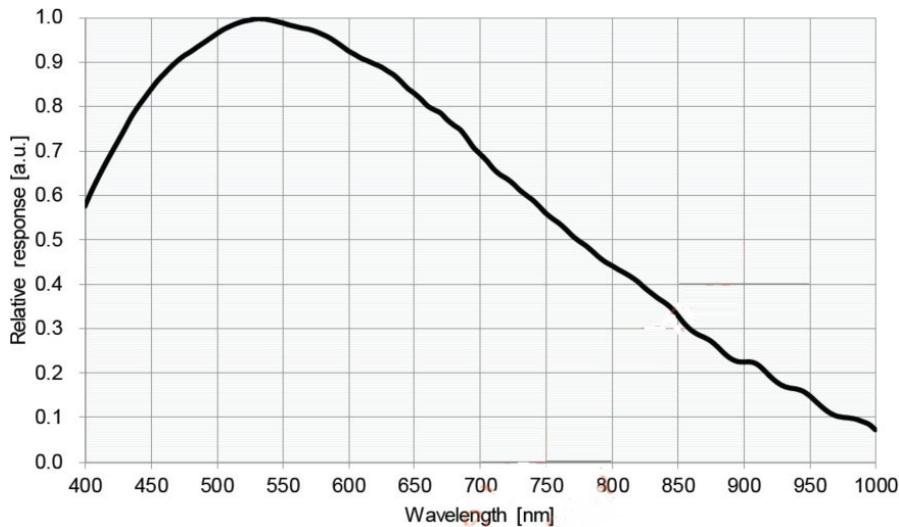


Figure 6-2 SCC571-M-TR spectral response curve

## 6.3 SCC571-C-TR

Table 6-3 SCC571-C-TR camera specifications

Parameter	Model	SCC571-C-TR (IUC26000KPA)
		26.0M pixels 1.8"(APS-C) CMOS USB3.0 industrial camera
		<b>Camera</b>
Sensor model	Sony IMX571BQR-C	
Pixel size	3.76 μm x 3.76 μm	
Sensor size	1.8"(APS-C)	
Frame rate	14fps@6224 x 4168(16bit), 37fps@3104 x 2084, 110fps@2064 x 1388	
Dynamic range	86.8dB	
Signal-to-Noise ratio	47.1dB	
Sensitivity	484.5mv	
Dark current	0.07mv	
Gain range	1x-50x	
Exposure time	150us-15sec	
Shutter	Rolling shutter	
Binning	Hardware 2x2, 3x3; Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 16bit	
		<b>General Specifications</b>
Power supply	12V Power adapter	
Power consumption	<5.0W	
Temperature	Working temperature-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	540g	
Lens mount	M42 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

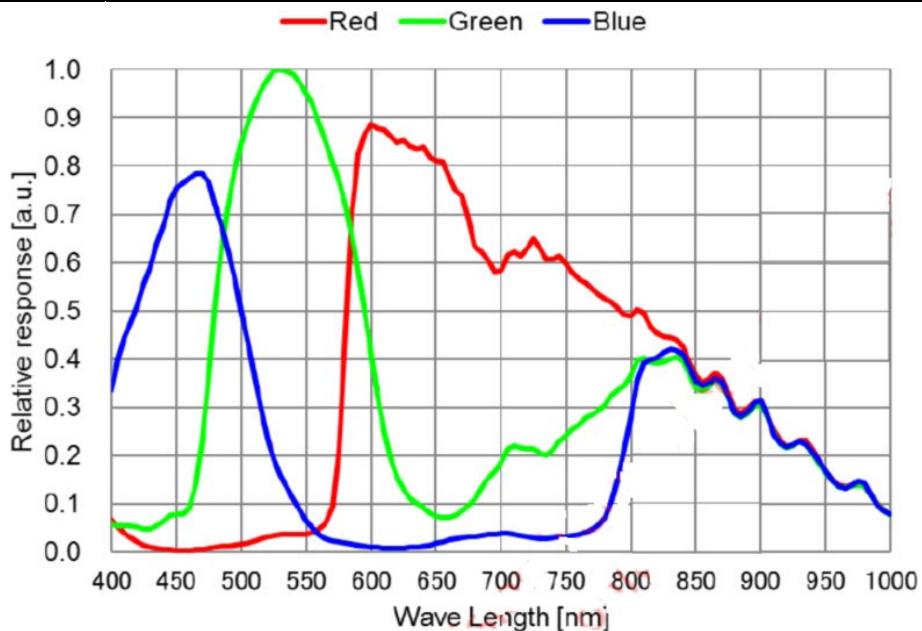


Figure 6-3 SCC571-C-TR spectral response curve

## 6.4 SCC342-M-TR

Table 6-4 SCC342-M-TR camera specifications

Parameter	Model	SCC342-M-TR (IUC31000KMA)
	31.0M pixels 1.8"(APS-C) CMOS USB3.0 industrial camera	
Sensor model	Sony IMX342LLA	Camera
Pixel size	3.45 μm x 3.45 μm	
Sensor size	1.8" (APS-C)	
Frame rate	12.0fps@6464 x 4852, 45.9fps@3216 x 2426	
Dynamic range	73.6dB	
Signal-to-Noise ratio	40.4dB	
Peak QE	71%@575nm	
Sensitivity	1830mV	
Dark current	0.15mV	
Gain range	1x-50x	
Exposure time	31μs-15sec	
Shutter	Global shutter	
Binning	Hardware 2x2; Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
General Specifications		
Power supply	12V Power adapter	
Power consumption	<7.7w	
Temperature	Working temperayure-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	545g	
Lens mount	M42 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

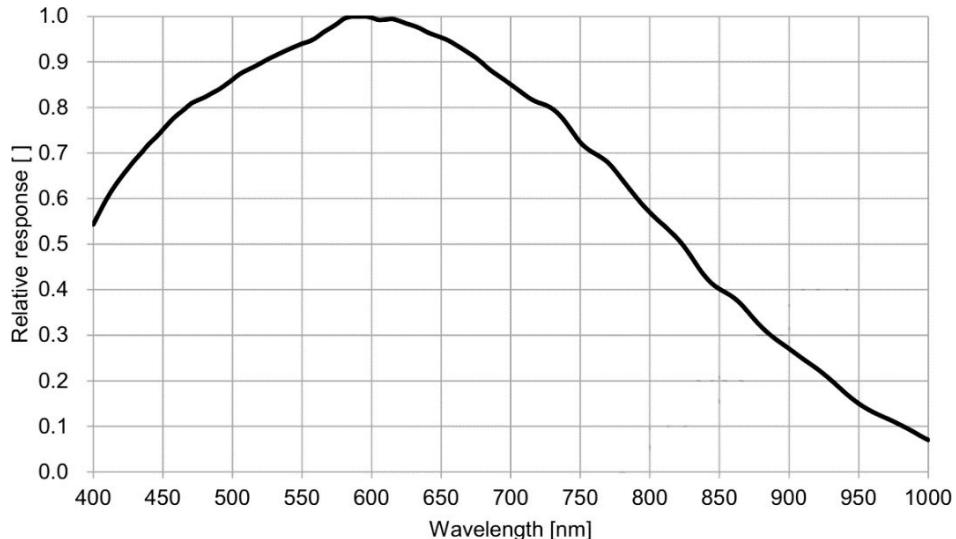


Figure 6-4 SCC342-M-TR spectral response curve

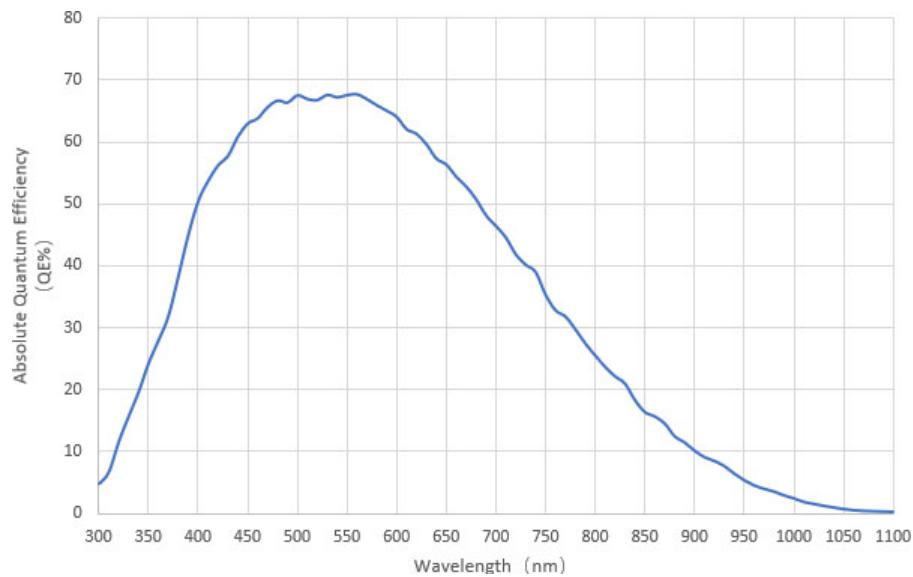


Figure 6-5 SCC342-M-TR absolute quantum efficiency

## 6.5 SCC342-C-TR

Table 6-5 SCC342-C-TR camera specifications

Parameter	Model	SCC342-C-TR (IUC31000KPA)
		31.0M pixels 1.8"(APS-C) CMOS USB3.0 industrial camera
Sensor model	Sony IMX342LQA	
Pixel size	3.45 μm x 3.45 μm	
Sensor size	1.8" (APS-C)	
Frame rate	12.0fps@6464 x 4852, 45.9fps@3216 x 2426	
Dynamic range	73.6dB	
Signal-to-Noise ratio	40.4dB	
Sensitivity	1146mV	
Dark current	0.15mV	
Gain range	1x-50x	
Exposure time	31μs-15sec	
Shutter	Global shutter	
Binning	Software 2x2, 3x3, 4x4	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 12bit	
<b>General Specifications</b>		
Power supply	12V Power adapter	
Power consumption	<7.7w	
Temperature	Working temperature-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	545g	
Lens mount	M42 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

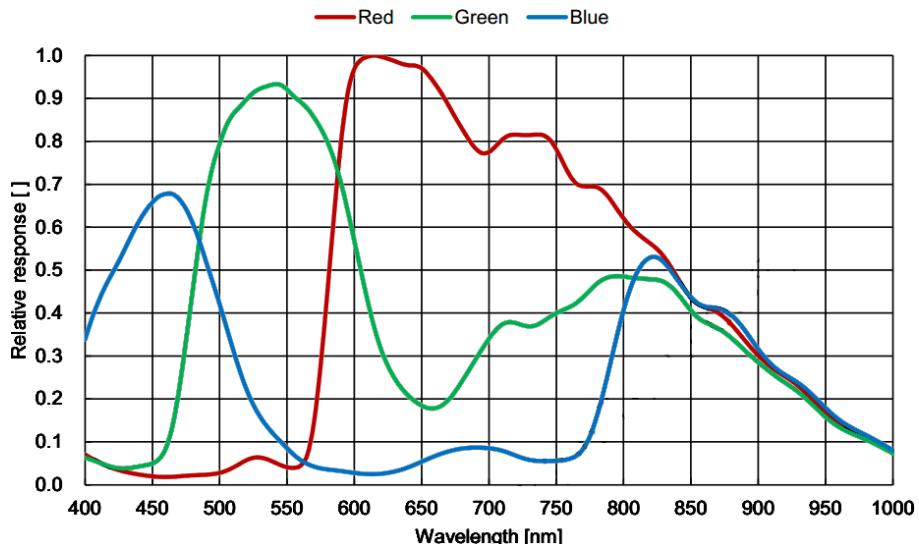


Figure 6-6 SCC342-C-TR spectral response curve

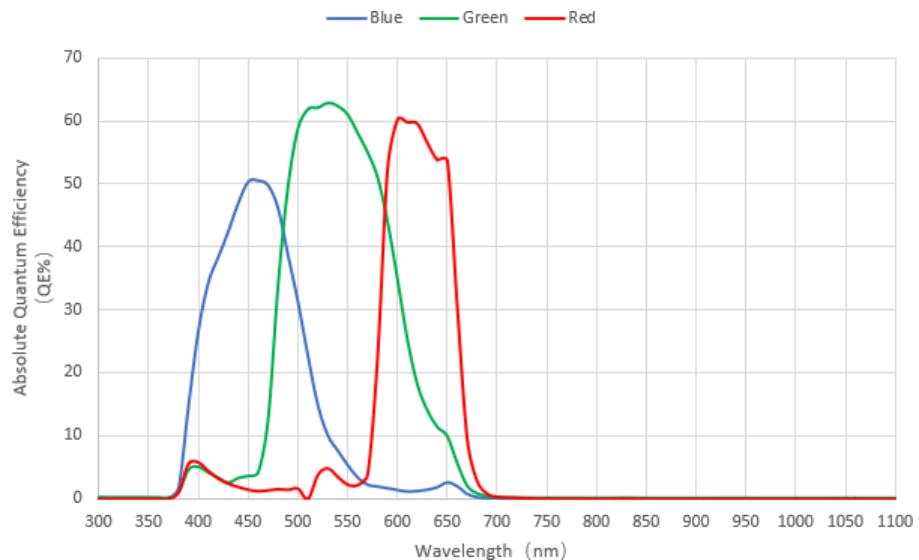


Figure 6-7 SCC342-C-TR absolute quantum efficiency

## 6.6 SCC455-M-TR

Table 6-6 SCC455-M-TR camera specifications

Parameter	Model	SCC455-M-TR (IUC60000KMA)
	60.0M pixels 2.7" (Full Frame) CMOS USB3.0 industrial camera	
Camera		
Sensor model	Sony IMX455ALK	
Pixel size	3.76 $\mu\text{m}$ x 3.76 $\mu\text{m}$	
Sensor size	2.7" (Full Frame)	
Frame rate	6.1fps@9568 x 6380(16bit), 24.6fps@4784 x 3190, 55.8fps@3184 x 2124, 191.0@1040 x 706	
Dynamic range	88.3dB	
Signal-to-Noise ratio	47.1dB	
Sensitivity	870.9mV	
Dark current	0.04mV	
Gain range	1x-50x	
Exposure time	150us-15sec	
Shutter	Rolling shutter	
Binning	Hardware 2x2, 3x3, 9x9; Software 2x2, 3x3, 9x9	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 16bit	
General Specifications		
Power supply	12V Power adapter	
Power consumption	<5.5W	
Temperature	Working temperature-10~50°C, storage temperature-30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	540g	
Lens mount	M52 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

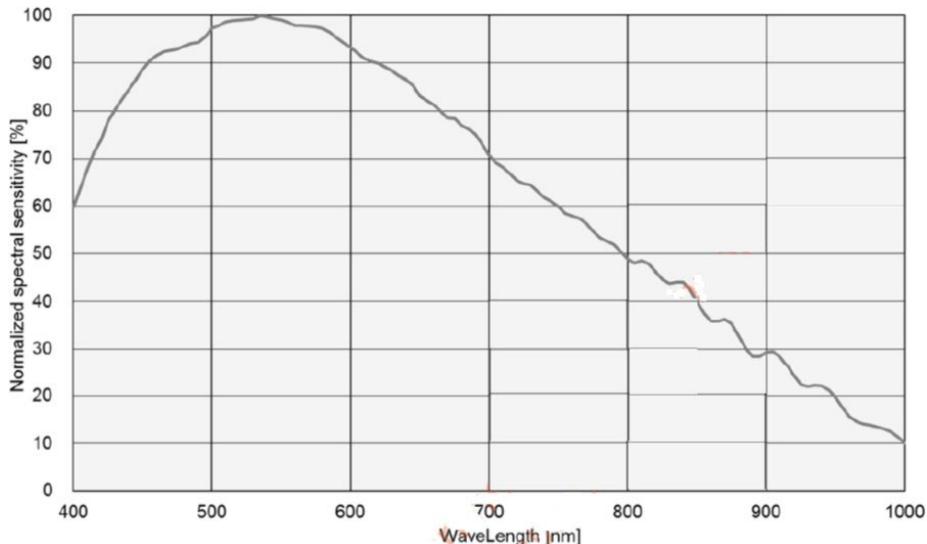


Figure 6-8 SCC455-M-TR spectral response curve

## 6.7 SCC455-C-TR

Table 6-7 SCC455-C-TR camera specifications

Parameter	Model	SCC455-C-TR (IUA60000KPA)
		60.0M pixels 2.7" (Full Frame) CMOS USB3.0 industrial camera
		Camera
Sensor model	Sony IMX455AQK	
Pixel size	3.76 μm x 3.76 μm	
Sensor size	2.7" (Full Frame)	
Frame rate	6.1fps@9568 x 6380(16bit), 24.6fps@4784 x 3190, 55.8fps@3184 x 2124, 191.0@1040 x 706	
Dynamic range	85.8dB	
Signal-to-Noise ratio	47.0dB	
Sensitivity	484.5mV	
Dark current	0.07mV	
Gain range	1x-50x	
Exposure time	150us-15sec	
Shutter	Rolling shutter	
Binning	Hardware 2x2, 3x3, 9x9; Software 2x2, 3x3, 9x9	
Data interface	USB3.0 (USB3.1 GEN1)	
Digital I/O	One optical-coupling isolated input, one optical-coupling isolated output, two non-isolated input and output	
Data Format	8bit / 16bit	
		General Specifications
Power supply	12V Power adapter	
Power consumption	<5.5W	
Temperature	Working temperature -10~50°C, storage temperature -30~70°C	
Humidity	20%-80%, no condensation	
Size	88mmx88mmx21.2mm	
Weight	540g	
Lens mount	M52 Interface	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

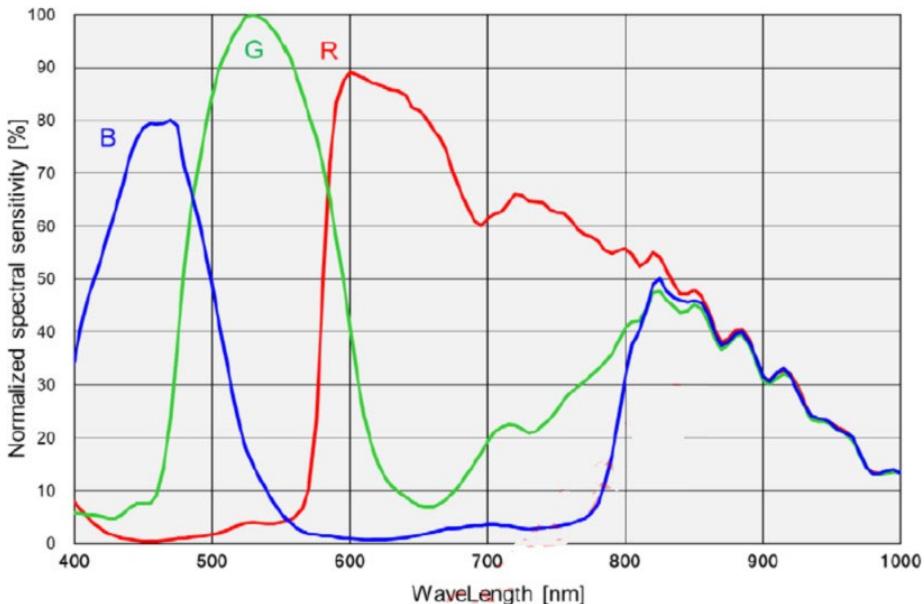


Figure 6-9 SCC455-C-TR spectral response curve

## 6 IUD Series Technical Specifications(2)

### 7.1 SCD16000-NIR-TR(NIRE, 20240313)

Table 7-1 SCD16000-NIR-TR camera specifications

Parameter	Model	SCD16000-NIR-TR
		16M CMOS USB3.0 industrial camera
		Camera
Sensor model	PYTHON 16K	
Pixel size	4.5 μm x 4.5 μm	
Sensor size		
Frame rate	22.5@4096x4096	
Dynamic range	TBD	
Signal-to-Noise ratio	TBD	
Sensitivity	TBD	
Dark current	TBD	
Gain range	1x-50x	
Exposure time	1us-60s	
Shutter	Global shutter	
Binning	Hardware 1x1, 2x2, 3x3	
Data interface	USB3.0(USB3.1 GEN1)	
Digital I/O	Two non-isolated input, Three non-isolated output	
Data Format	8bit / 12bit	
General Specifications		
Power supply	Power with USB3.0	
Power consumption	TBD	
Temperature	Working temperature -10~50°C, storage temperature -30~70°C	
Humidity	20%-80%, no condensation	
Size	59mm×59mm×27.2mm	
Weight	139.3g	
Lens mount	C-mount	
Software	EHDView/ SDK	
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64	
Certification	CE, FCC	

Quantum Efficiency

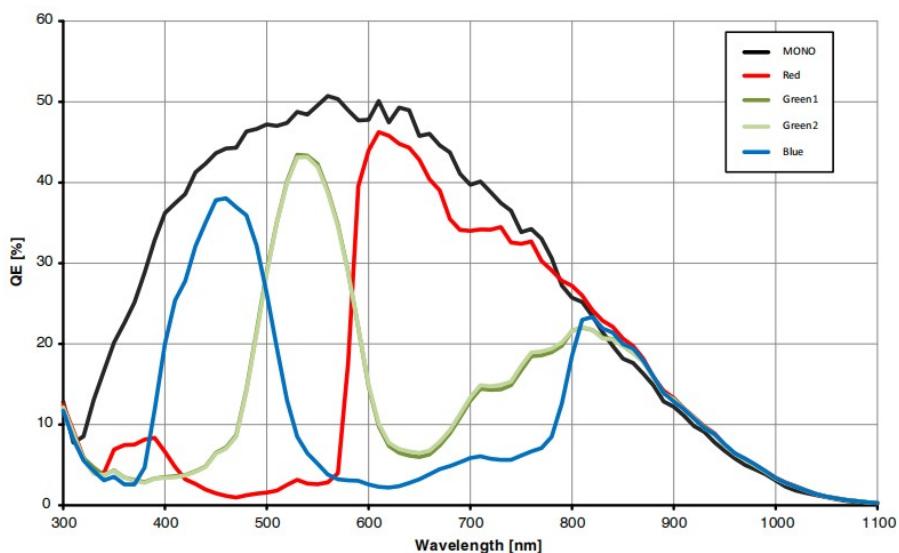


Figure 7-1 SCD16000-NIR-TR spectral response curve

## 7.2 SCD25000-NIR-TR(NIRE, 20240228)

Table 7-2 SCD25000-NIR-TR camera specifications

Parameter \ Model	SCD25000-NIR-TR
	25M 2.04" CMOS USB3.0 industrial camera
	Camera
Sensor model	PYTHON 25K
Pixel size	4.5 μm x 4.5 μm
Sensor size	2.04"
Frame rate	14.8fps@5120x5120、14.8fps@2560x2560、14.8fps@1664x1664
Dynamic range	59dB
Signal-to-Noise ratio	41dB
Sensitivity	<1/5000
Dark current	3.9e^-/s@ 20°C
Gain range	1x-50x
Exposure time	1us-60s
Shutter	Global shutter
Binning	Hardware 1x1, 2x2, 3x3
Data interface	USB3.0(USB3.1 GEN1)
Digital I/O	Two non-isolated input, Three non-isolated output
Data Format	8bit / 12bit
<b>General Specifications</b>	
Power supply	Power with USB3.0
Power consumption	TBD
Temperature	Working temperature -10~50°C, storage temperature -30~70°C
Humidity	20%-80%, no condensation
Size	59mm×59mm×27.2mm
Weight	139.3g
Lens mount	C-mount
Software	EHDView/ SDK
Platform and architecture	Win32/WinRT/Linux/macOS/Android; X86/X64/armhf/armel/arm64
Certification	CE, FCC

Quantum Efficiency

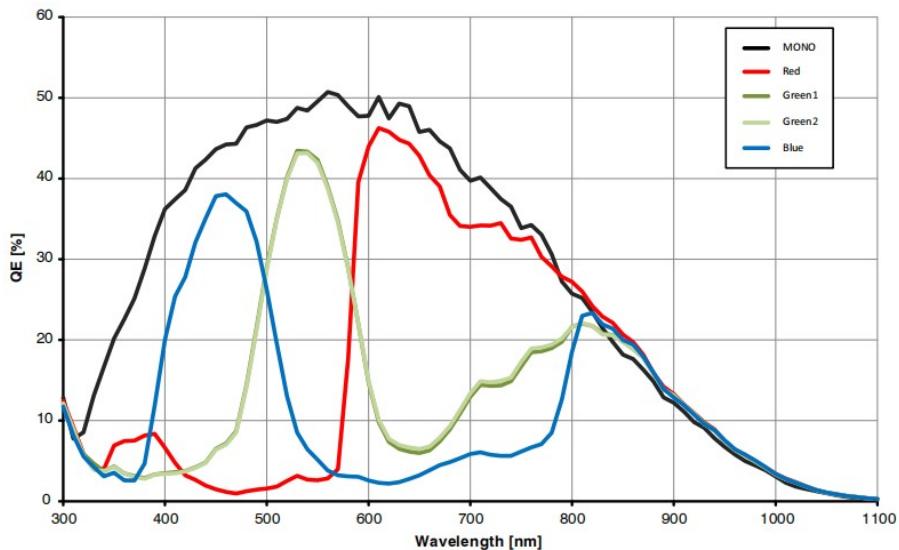


Figure 7-2 SCD25000-NIR-TR spectral response curve

## 7 Camera Dimension and Interface

### 7.1 SWIR Series

#### 7.1.1 Camera Mechanical Housing Dimensions

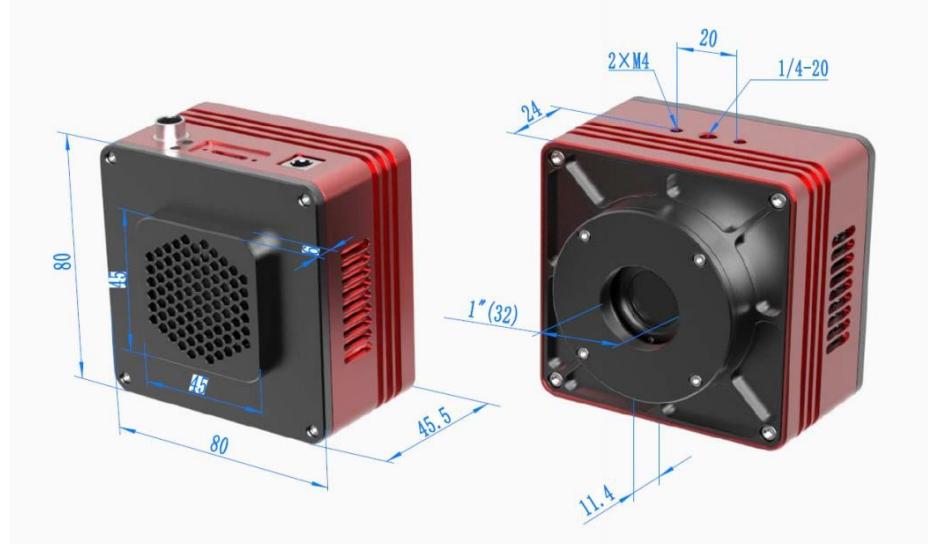


Figure 9-1 SWIR series camera

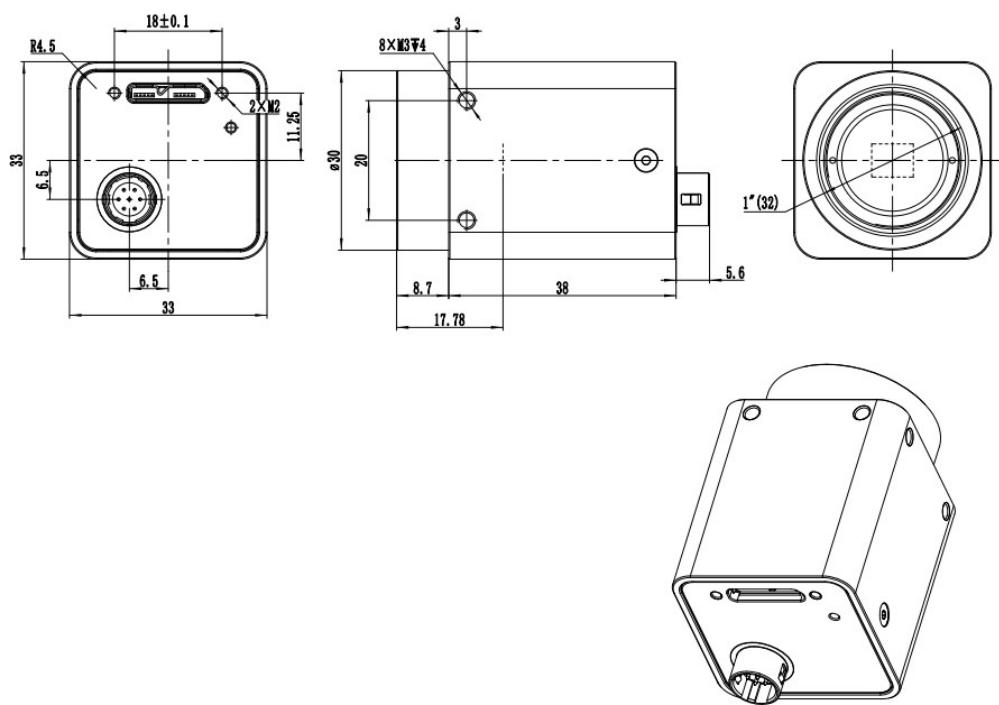


Figure 9-2 SWIR-UMV series camera

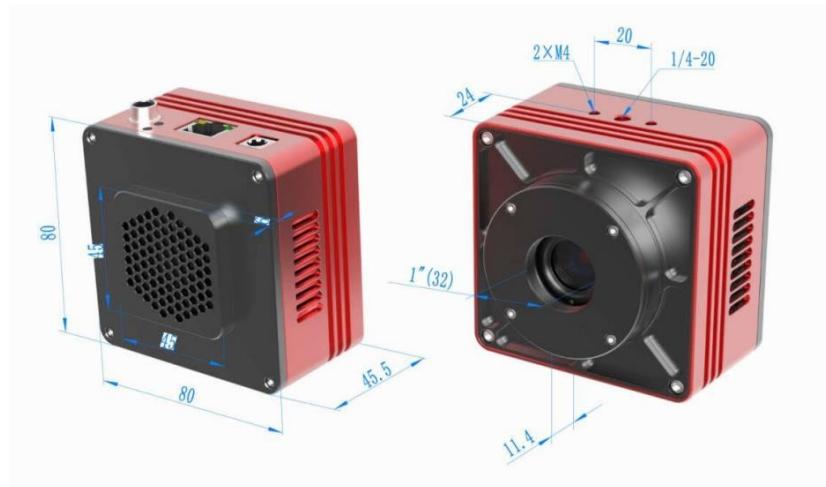


Figure 9-3 SWIR-G series camera

### 7.1.2 Camera Interface

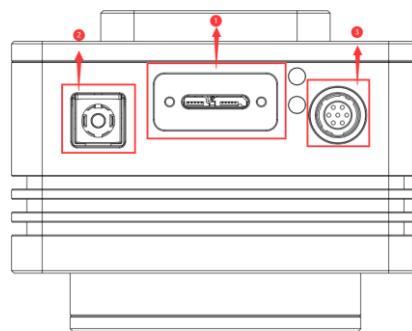


Figure 9-4 SWIR series Camera design and its ports

Table 9-1 SWIR series Camera interface

Item	Specification
1	USB3.0 port
2	DC 12V power slot
3	External IO connection port



Figure 9-5 SWIR-UMV series Camera design and its ports

Table 9-2 SWIR-UMV series Camera interface

Item	Specification
1	USB3.0 port
2	External IO connection port

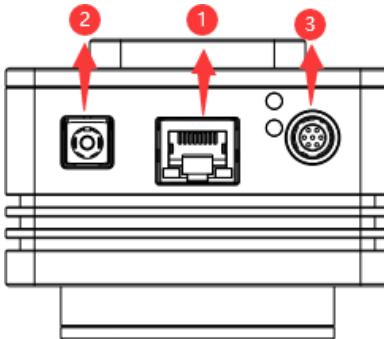


Figure 9-6 SWIR-G series Camera design and its ports

Table 9-3 SWIR-G series Camera interface

Item	Specification
1	GigE port
2	DC 12V power slot
2	External IO connection port

### 7.1.3 Power Supply and I/O Connector

The pin signal definition for the SWIR and SWIR-G series camera 7 Pin I/O connector is shown in Table 9-4.

Table 9-4 SWIR and SWIR-G series pin signal definition(

	Color	Pin	Signal	Signal description
	White	1	GND	Direct-coupled signal ground
	Red	2	12V	12VDC power input or output
	Blue	3	OPTO_GND	Opto-isolated signal ground
	Yellow	4	DIR_GPIO0	Direct-coupled General Purpose I/O (Software configurable input/output) (line2)
	Black	5	DIR_GPIO1	Direct-coupled General Purpose I/O (Software configurable input/output) (line3)
	Green	6	OPTO_IN	Opto-isolated input signal (line0)
	Pink	7	OPTO_OUT	Opto-isolated output signal (line1)

The pin signal definition for the SWIR-UMV series camera 6 Pin I/O connector is shown in Table 9-5.

Table 9-5 SWIR-UMV series pin signal definition

	Color	Pin	Signal	Signal description
	red	1	DIR_GPIO	Direct-coupled General Purpose I/O (Software configurable input / output) (line2)
	white	2	OPTO_GND	Opto-isolated signal ground
	blue	3	OPTO_OUT	Opto-isolated output signal(line1)
	green	4	OPTO_IN	Opto-isolated input signal(line0)
	black	5	GND	Direct-coupled signal ground
	yellow	6	5V	5 VDC power input

### 9.1.1 Packing Information

For normal use of industrial cameras, please prepare the required accessories as shown in table before installation.

Table 9-6 SWIR series Recommended accessories

Order number	Accessories name	Quantity	Instruction
1	Camera	1	Camera referred in this manual
2	I/O cable	1	7 Pin cable or extended cable
3	USB3.0 cable	1	Suitable length of Micro USB3.0 cable
4	Power adapter	1	Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 3A
5	Lens (optional)	1	C-mount lens

Table 9-7 SWIR-UMV series Recommended accessories

Order number	Accessories name	Quantity	Instruction
1	Camera	1	Camera referred in this manual
2	I/O cable	1	6 Pin cable or extended cable
3	USB3.0 cable	1	Suitable length of Micro USB3.0 cable
4	Lens (optional)	1	C-mount lens

Table 9-8 SWIR-G series Recommended accessories

Order number	Accessories name	Quantity	Instruction
1	Camera	1	Camera referred in this manual
2	I/O cable	1	7 Pin cable or extended cable
3	GigE cable	1	3m / 5m / 10m / 50m GigE cable
4	Power adapter	1	Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 3A
5	Lens (optional)	1	C-mount lens

## 7.2 MaxCam-331 Series

### 7.2.1 The dimension of the MaxCam-331 series camera (CL and GigE)

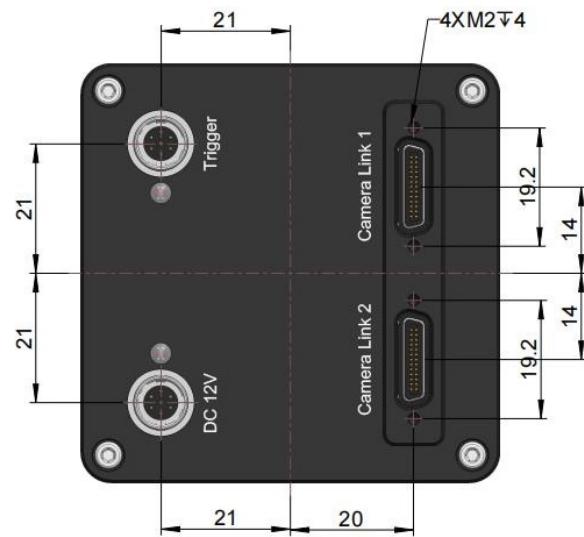


Figure 9-7 The rear cover interface layout of the MaxCam-331 Short-Wavelength Infrared Camera (CL interface)

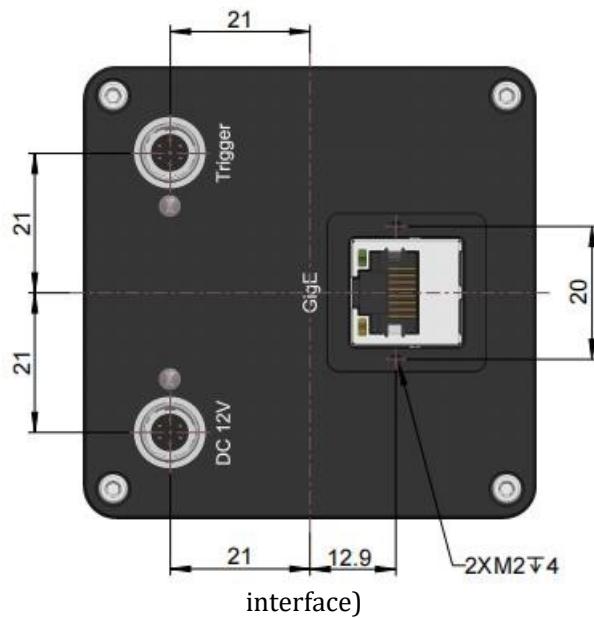


Figure 9-8 The rear cover interface layout of the MaxCam-331 Short-Wavelength Infrared Camera (GigE interface)

The Front and side view dimensions of the MaxCam-331 series camera is shown in Figure 9-9.

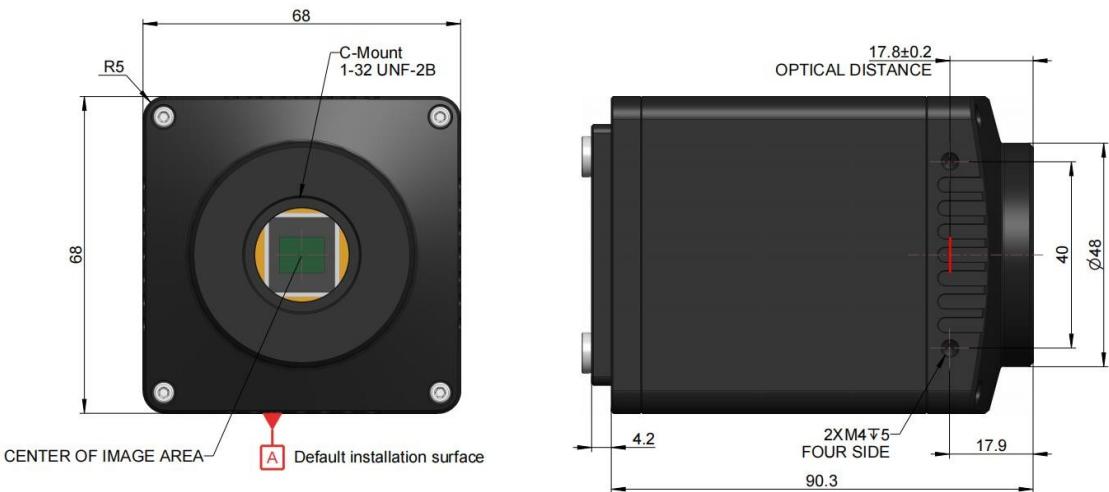


Figure 9-9 The Front and side view dimensions of the MaxCam-331 series

cameraTable 9-9 The Dimension of the MaxCam-331 series camera

Parameter	Specification
Dimension	68*68*90.3mm
The MaxCam-331 series camera lensinterface	Standard C mount

### 7.2.2 The back view of the MaxCam-331 series camera(CL and GigE)

The rear interface of the MaxCam-331 series camera is shown in Figure 9-10, the description is shown in Table9-10.

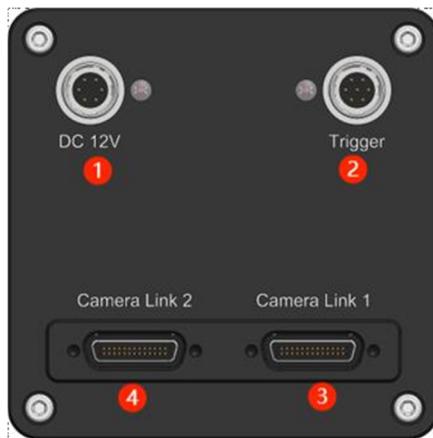


Figure 9-10 The rear interface of the MaxCam-331 series

cameraTable 9-10 The rear interface of the MaxCam-331

series camera

Order	Specification
1	DC 12V power slot
2	External IO connecter
3	CameraLink1
4	CameraLink2

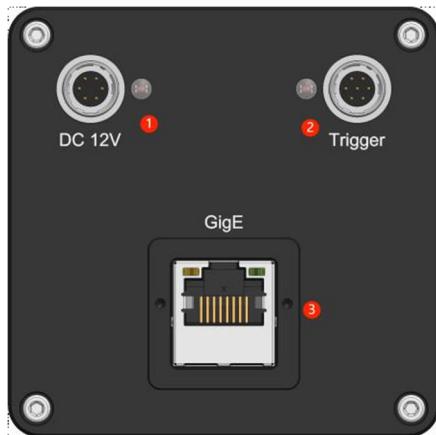


Figure 9-11 The rear interface of the MAXCAM-331 series camera  
Table 9-11 The rear interface of the MAXCAM-331 series camera

Order	Specification
1	DC 12V power slot
2	External IO connector
3	GigE

### 9.2.1 Power Supply and I/O Connector

Table 9-12 The MAXCAM-331 series camera DC12V pin signal definitions

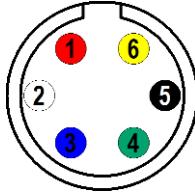
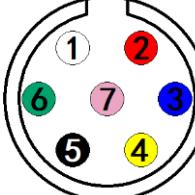
	Color	Pin	Signal	Description of the signal
	Red	1	12V	12V power supply positive
	Yellow	6	12V	
	Black	5	12V	
	White	2	GND	12V power supply negative
	Blue	3	GND	
	Green	4	GND	

Table 9-13 MAXCAM-331 series camera Trigger pin signal definitions

	颜色	管脚	信号	信号描述说明
	Blue	3	OPTO_GND	Opto-isolated signal ground
	Green	6	OPTO_IN	Opto-isolated input signal (line0)
	Pink	7	OPTO_OUT	Opto-isolated output signal (line1)

## 7.3 IUA Series

### 7.3.1 IUA Series Camera Mechanical Housing Dimensions



Figure 9-12 IUA series camera

Figure 9-13 Dimensions of IUA camera housing (mm)

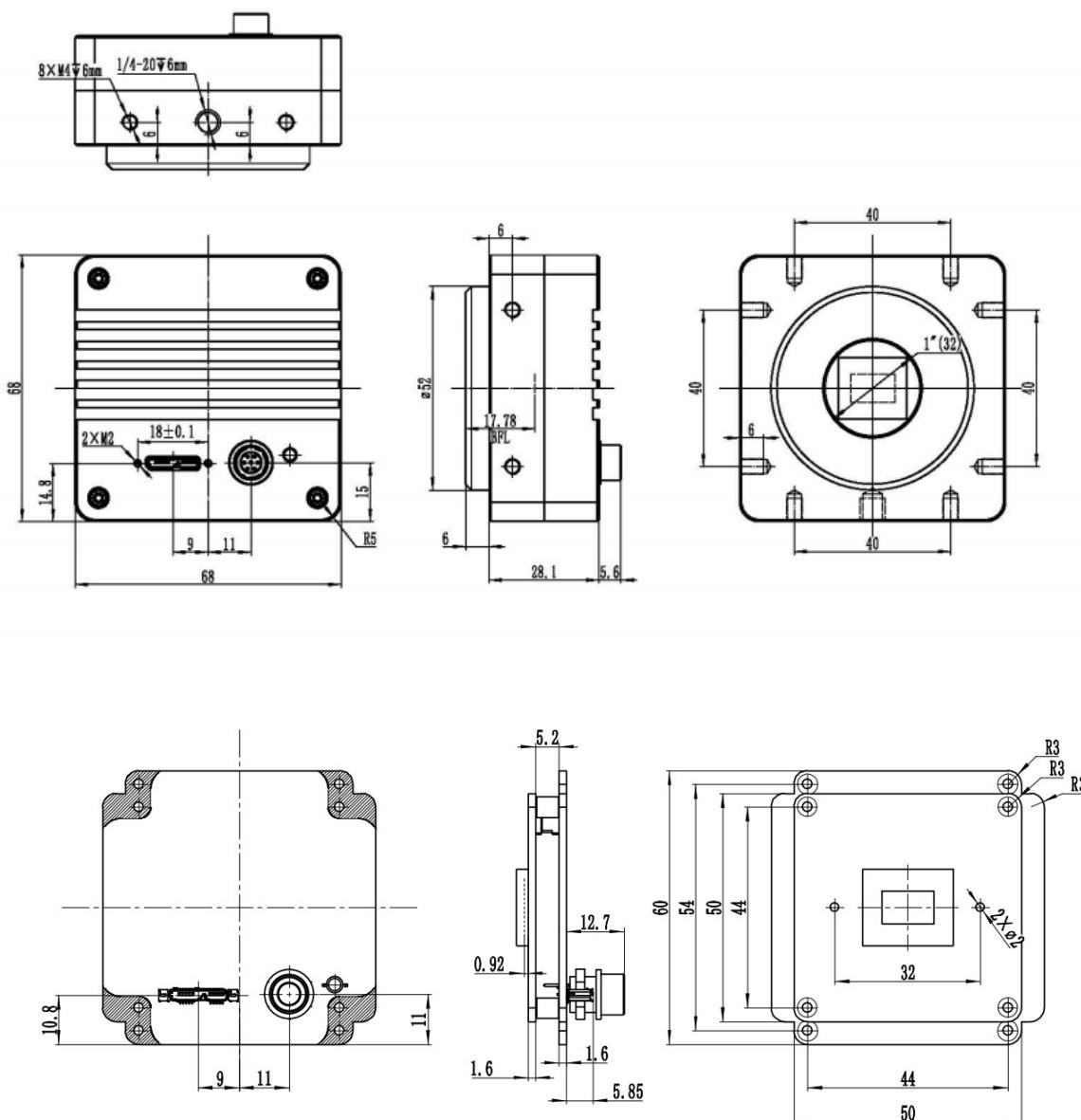


Figure 9-14 Dimensions of IUA circuit board (mm)

### 7.3.2 IUA Series Camera Interface

The back of the industrial camera is shown in Figure 9-15. It has standard USB3.0 output, 7 Pin I/O port (aviation head) and on/off indicator. It has two M2 screw holes on both sides of USB 3.0 port to fix the cable. The holes reduce cable loosening caused by field vibration.

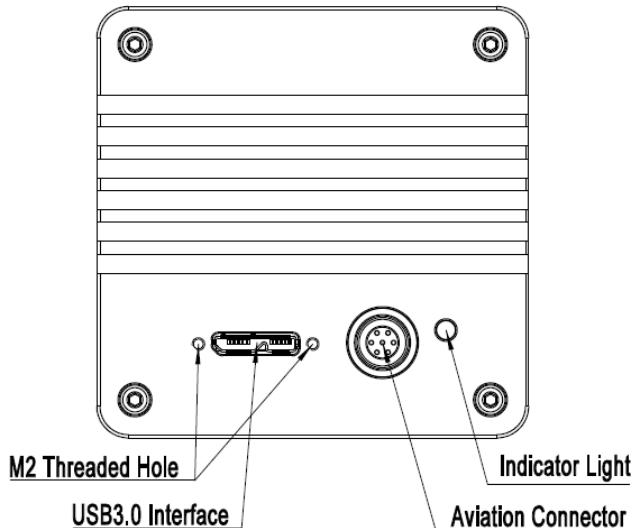


Figure 9-15 Schematic diagram of IUA camera back panel

### 7.3.3 IUA Series Camera Power Supply and I/O Connector

The pin signal definition for the IUA series camera 7 Pin I/O connector is shown in Table 9-14.

Table 9-14 IUA series pin signal definition

Color	Pin	Signal	Signal description
White	1	GND	Direct-coupled signal ground
Red	2	12V	12VDC power input or output
Blue	3	OPTO_GND	Opto-isolated signal ground
Yellow	4	DIR_GPIO0	Direct-coupled General Purpose I/O (Software configurable input/output) (line2)
Black	5	DIR_GPIO1	Direct-coupled General Purpose I/O (Software configurable input/output) (line3)
Green	6	OPTO_IN	Opto-isolated input signal (line0)
Pink	7	OPTO_OUT	Opto-isolated output signal (line1)

### 7.3.4 Packing Information

For normal use of industrial cameras, please prepare the required accessories as shown in Table 9-15 before installation.

Table 9-15 Recommended accessories for IUA series camera

Order number	Accessories name	Quantity	Instruction
1	Camera	1	Camera referred in this manual
2	I/O cable	1	7 Pin cable or extended cable
3	USB3.0 cable	1	Suitable length of Micro USB3.0 cable
4	Lens (optional)	1	C-mount lens

## 7.4 IUC Series

### 7.4.1 IUC Series Camera Mechanical Housing Dimensions



Figure 9-20 IUC series camera

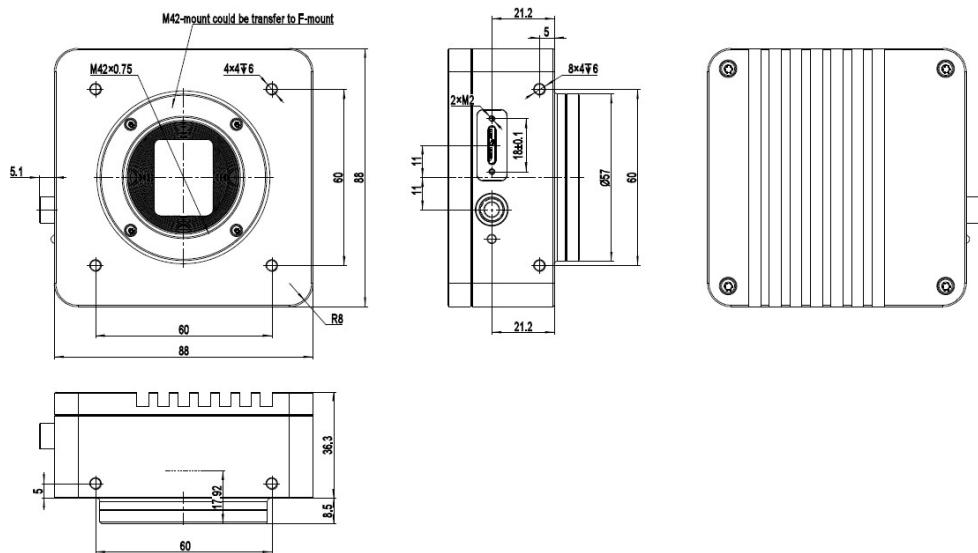


Figure 9-21 Dimensions of IUC camera housing (mm)

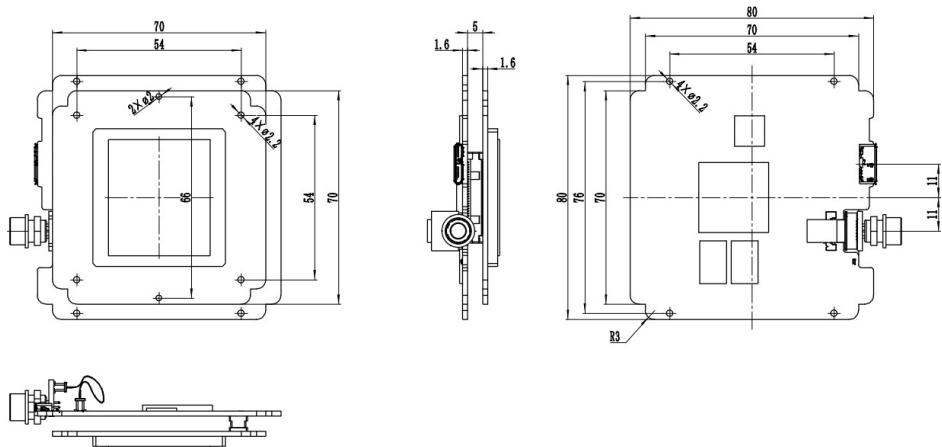


Figure 9-22 Dimensions of IUC circuit board (mm)

### 7.4.2 IUC Series Camera Interface

The back of the industrial camera is shown in Figure 9-23. It has standard USB3.0 output, 7 Pin I/O port (aviation head) and on/off indicator. It has two M2 screw holes on both sides of USB 3.0 port to fix the cable. The holes reduce cable loosening caused by field vibration.

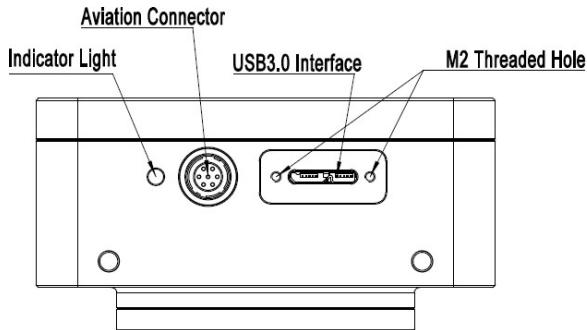


Figure 9-23 Schematic diagram of IUC camera back panel

### 7.4.3 IUC Series Camera Power Supply and I/O Connector

The pin signal definition for the IUC series camera 7 Pin I/O connector is shown in Table 9-18.

Table 9-18 IUC series pin signal definitions

Color	Pin	Signal	Signal description
White	1	GND	Direct-coupled signal ground
Red	2	12V	5VDC power input or output
Blue	3	OPTO_GND	Opto-isolated signal ground
Yellow	4	DIR_GPIO0	Direct-coupled General Purpose I/O (Software configurable input/output) (line2)
Black	5	DIR_GPIO1	Direct-coupled General Purpose I/O (Software configurable input/output) (line3)
Green	6	OPTO_IN	Opto-isolated input signal (line0)
Pink	7	OPTO_OUT	Opto-isolated output signal (line1)

### 7.4.4 Packing Information

For normal use of industrial cameras, please prepare the required accessories as shown in Table 9-19 before installation.

Table 9-19 Recommended accessories for IUC series camera

Order number	Accessories name	Quantity	Instruction
1	Camera	1	Camera referred in this manual
2	I/O cable	1	7 Pin cable or extended cable
3	USB3.0 cable	1	Suitable length of Micro USB3.0 cable
4	Power (IUC)	1	Power adapter for IUC series
5	Lens (optional)	1	C-mount lens

## 7.5 IUD Series

### 7.5.1 IUD Series Camera Mechanical Housing Dimensions

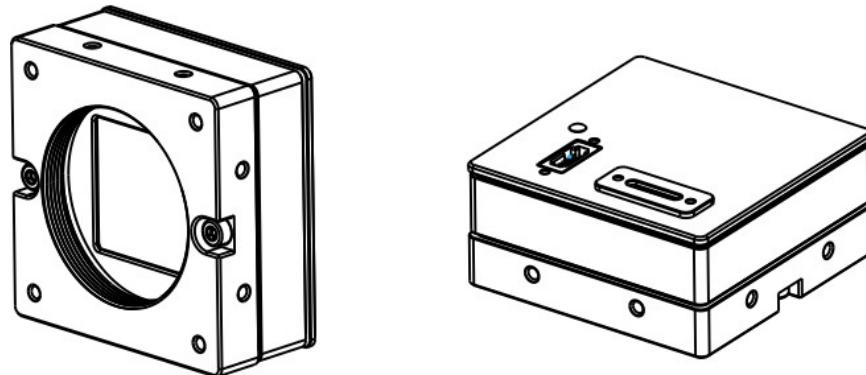


Figure 9-24 IUD series camera

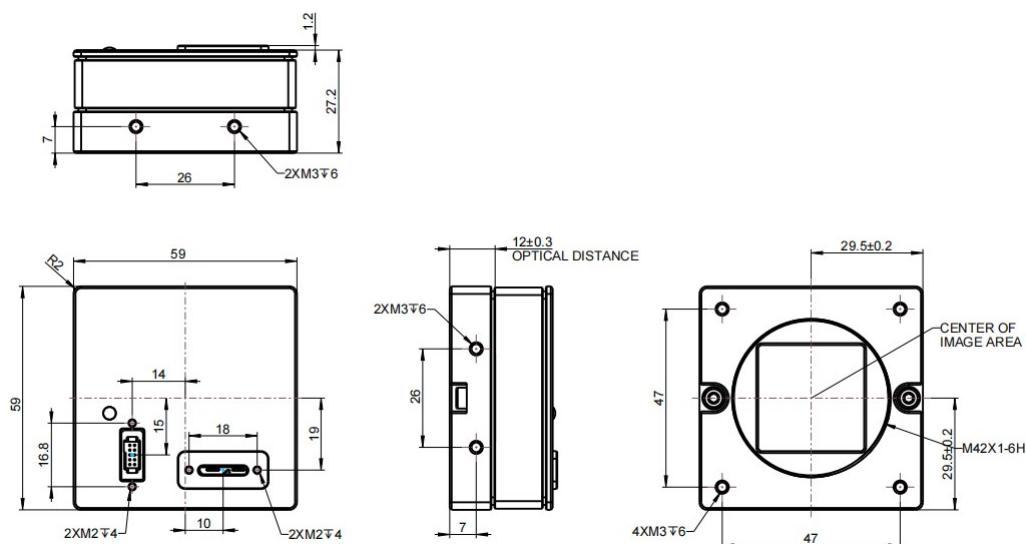


Figure 9-25 Dimensions of IUD camera housing (mm)

### 7.5.2 IUD Series Camera Interface

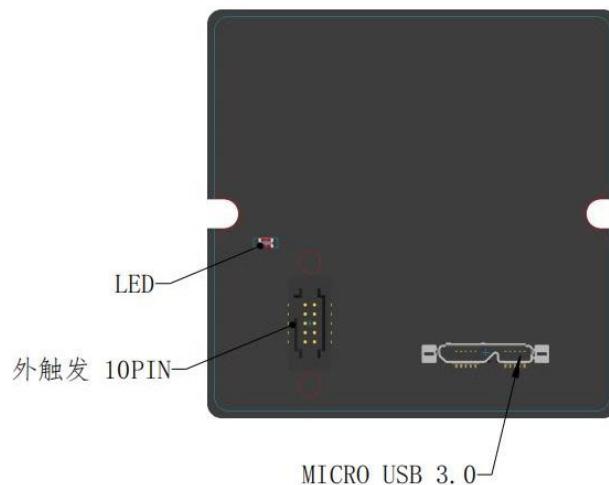


Figure 9-26 Schematic diagram of IUD camera back panel

### 7.5.3 IUD Series Camera Power Supply and I/O Connector

The pin signal definition for the IUD series camera 10 Pin I/O connector is shown in Table 9-20.

Table 9-20 IUD series pin signal definitions

	<b>Pin</b>	<b>Signal</b>	<b>Signal description</b>	
Chassis	10	GND	Power ground	
GPO 2	8	12V	12VDC power	
GPO 1	6	GPI_GND	General Input Common Ground	
GPO-Power	4	GPO-POWER	General Output Common Power	
PWR-VCC	2	5	GPII	General External Input 1
		6	GPO1	General External Output 1
		7	GPI2	Opto-isolated output signal
		8	GPO2	General External Output 2
		9	GPO3	General External Output 3
		10	Chassis	Camera Chassis

### 7.4.4 Packing Information

For normal use of industrial cameras, please prepare the required accessories as shown in Table 9-21 before installation.

Table 9-21 Recommended accessories for IUC series camera

<b>Ordernumber</b>	<b>Accessories name</b>	<b>Quantity</b>	<b>Instruction</b>
1	Camera	1	Camera referred in this manual
2	I/O cable	1	10 Pin cable or extended cable
3	USB3.0 cable	1	Suitable length of Micro USB3.0 cable
4	Power (IUD)	1	Power adapter for IUD series
5	Lens (optional)	1	C-mount lens

## 8 Electrical Characteristics

### 8.1 SWIR and IUX Series Camera's I/O Electrical Properties

#### 8.1.1 Opto-isolated Input Circuit (line0)

In the camera I/O control, opto-isolated input circuit is shown in Figure 10-1.

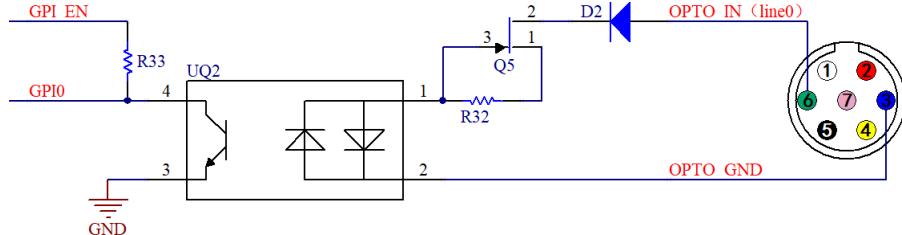


Figure 10-1 Opto-isolated input circuit

Logic 0 input level: 0~2.2VDC (OPTO\_IN pin)

Logic 1 input level: 3.3~24VDC (OPTO\_IN pin)

Maximum input current: 30mA

The input level is between 2.2V and 3.2V, the circuit action state is uncertain, please avoid the input voltage working in this range.

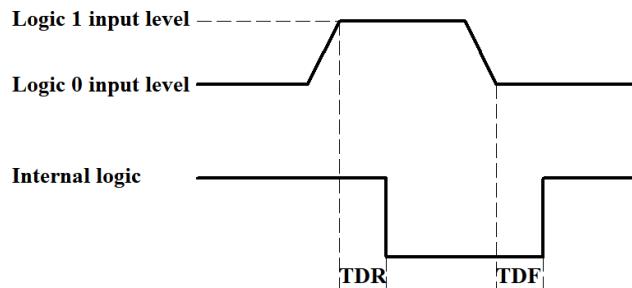


Figure 10-2 Input logic level

Input rise delay (TDR): 6us

Input drop delay (TDF): 6us

#### 8.1.2 Opto-isolated Output Circuit(line1)

In camera I/O control, opto-isolated output circuit is shown in Figure 10-3.

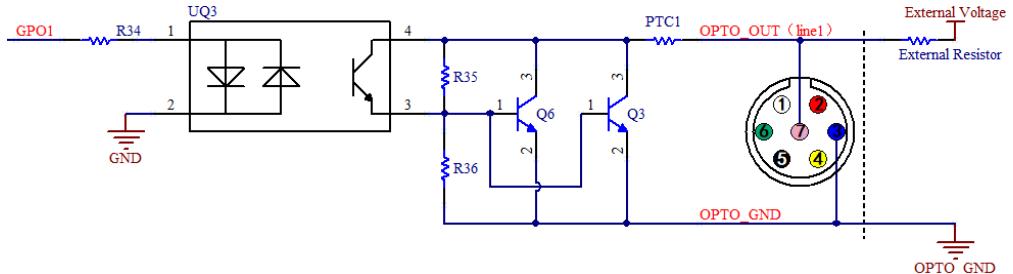


Figure 10-3 Opto-isolated output circuit

Opto-isolated output maximum current: 30mA

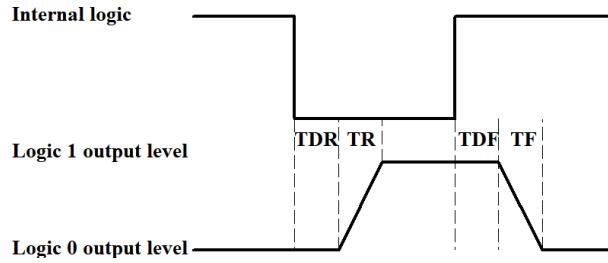


Figure 10-4 Output logic level

The electrical characteristics of the opto-isolated output signal (external voltage 5V, external resistor 1K) are shown in Table 10-1.

Table 10-1 Opto-isolated output signal's electrical characteristics

Parameter name	Parameter symbol	Parameter values
Output logic low level	VL	742mV
Output logic high	VH	4.134V
output rise time	TR	4us
Output downtime	TF	1.8us
Output rising delay	TDR	12us
Output drop delay	TDF	2us

The corresponding current and output logic low level parameters are shown in Table 10-2 when different voltage and resistors are used in external circuit.

Table 10-2 Opto-isolated output logic's low level parameters

External voltage	Non-essential resistance	VL	Output current
3.3V	1KΩ	510mV	2.82mA
5V	1KΩ	742mV	4.31mA
12V	2.4KΩ	795mV	4.68mA
24V	4.7KΩ	850mV	4.97mA

### 8.1.3 Input and Output I/O Circuit(line2/line3)

Non-isolated configurable input, output I/O circuit is shown in Figure 10-5, Figure 10-6.

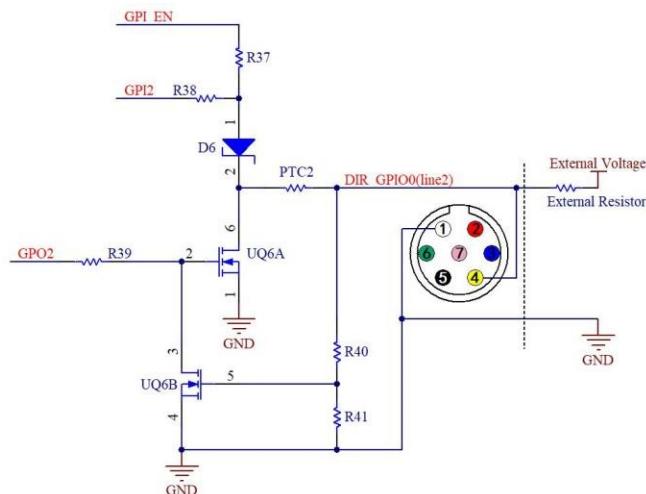


Figure 10-5 Non-isolated configurable input, output I/O circuit (line2)

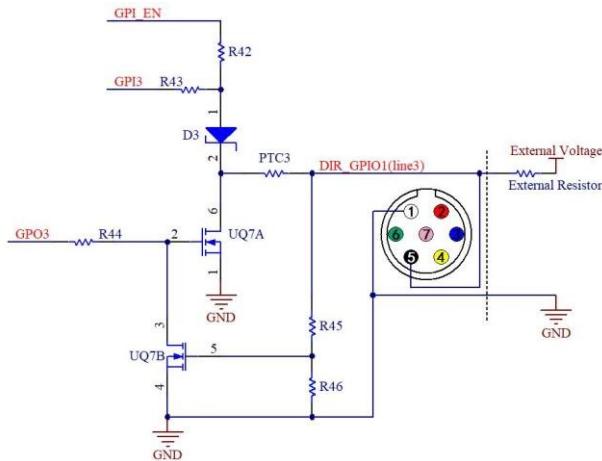


Figure 10-6 Non-isolated configurable input, output I/O circuit (line3)

1, Line2/line3 set as input pin:

Logic 0 input level: 0-0.6 VDC (DIR\_GPIO1/DIR\_GPIO2 pin)

Logic 1 input level: 2.0~24VDC (DIR\_GPIO1/DIR\_GPIO2 pin)

Maximum input current: 25mA

The input level is between 0.6V and 2.0V, the circuit action state is uncertain. Please avoid the input voltage working in this range.

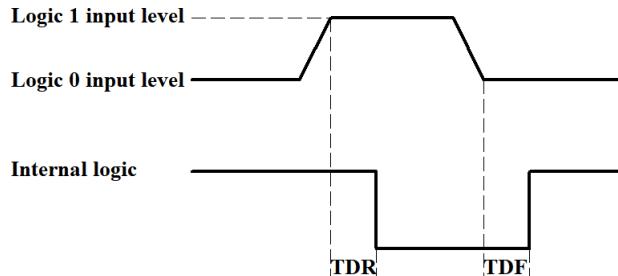


Figure 10-7 Input logic level

To prevent damage to the GPIO pin, connect the GND pin before entering voltage to the Line2 pin.

Input rise delay (TDR): 0.02us

Input drop delay (TDF): 0.02us

2, Line2/line3 set as output pin

The maximum current allowed through this pin is 25 mA.

When the ambient temperature is 25 degrees Celsius, the relationships between the external voltage, resistance and output low level are shown in Table 10-3.

Table 10-3 Non-isolated output logic's low level parameters

External voltage	Non-essential resistance	VL(GPIO)
3.3V	1KΩ	0.11V
5V	1KΩ	0.167V
12V	2.4KΩ	0.184V
24V	4.7KΩ	0.385V

The external pull-up voltage 5V pull-up resistance 1KΩ, GPIO output logic level, electrical characteristics are shown in Figure 10-8.

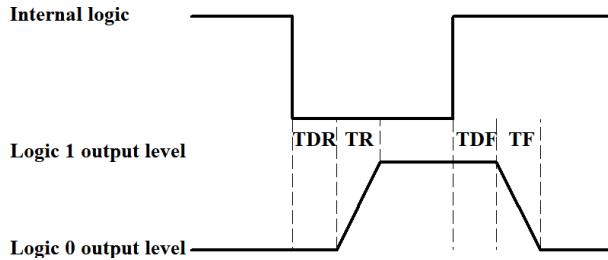


Figure 10-8 Output logic level

Table 10-4 Non-isolated output's electrical characteristics

Parameter name	Parameter symbol	Parameter values
Output rise time	TR	0.08us
Output downtime	TF	0.02us
Output rising delay	TDR	0.1us
Output drop delay	TDF	0.04us

## 9 Description of Functions

### 9.1 Camera Capture Mode

Camera operation mode support: Video Mode or Trigger Mode.

Camera trigger mode supports: Soft Trigger Mode(Software) or External Trigger Mode(Isolated input, GPIO0, GPIO1, Counter or PWM).

### 9.2 ROI Control

Partial cameras supports hardware ROI. The smaller the ROI size, the faster the frame rate.

### 9.3 Bandwidth and Precise Frame Rate Control

#### 9.3.1 Bandwidth

Partial cameras supports bandwidth adjustment from 1% to 100%. As shown in Figure 11-1, the camera is with 100% bandwidth by default, and you can drag the slider to set the desired bandwidth.

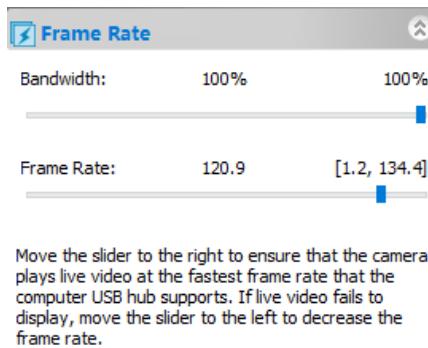


Figure 11-1 Bandwidth and precise frame rate settings

#### 9.3.2 Precise Frame Rate Control

Partial cameras series supports precise frame rate control. The frame rate range will vary based on bandwidth, bit depth, resolution, ROI. As shown in Figure 11-1, the current frame rate can be set by dragging the Bandwidth or Frame Rate slider bar left or right.

### 9.4 DDR3 Buffer

Camera has a built-in 512MB (4Gb) DDR3 buffer, which can effectively improve the stability of USB3.0 data transmission and ensure that the camera does not lose frames when working.

## 9.5 Binning

Camera supports additive or averaged 1x1 to 8x8 digital binning, and averaged 1x1 to 2x2 hardware binning. Hardware binning can achieve higher frame rates than software binning.

## 9.6 DC12V Power Supply and Cooling System

For the SWIR series camera, when the DC12V power supply is plugged in, both the camera cooling system and the imaging system use a unified 12V power supply.

When the DC12V power supply is disconnected, the camera cooling system stops working, and the imaging system will automatically switch to the USB 5V power supply and the camera can work normally in passive cooling mode.

The cooling system of SWIR series has a built-in or external TEC cooling for the sensor. It uses an external heat dissipation structure and a fan to assist heat dissipation. The working temperature can be adjusted to a specific value, and the effective cooling temperature can be lower than the ambient temperature by 10 - 25 °C. The efficient cooling system guarantees extremely low dark current levels.

The TEC system is controlled by PID algorithm, so that the TEC can be accurately adjusted to the targettemperature, and the temperature deviation is 0.1°C.

## 10 Trigger Mode and its Configuration

### 10.1 Video Mode and Trigger Mode

The trigger function can be found on the [Capture & Resolution](#) group on the [Camera Sidebar](#) in EHDView. When the camera is opened, it is in [Video Mode](#) as shown in Figure 12-1 on the left. In [Video Mode](#), [Auto Exposure](#), [Exposure Target](#), [Exposure Time](#) and [Gain](#) can be set. One can switch to [Trigger Mode](#) by checking the [Trigger Mode](#) check box.

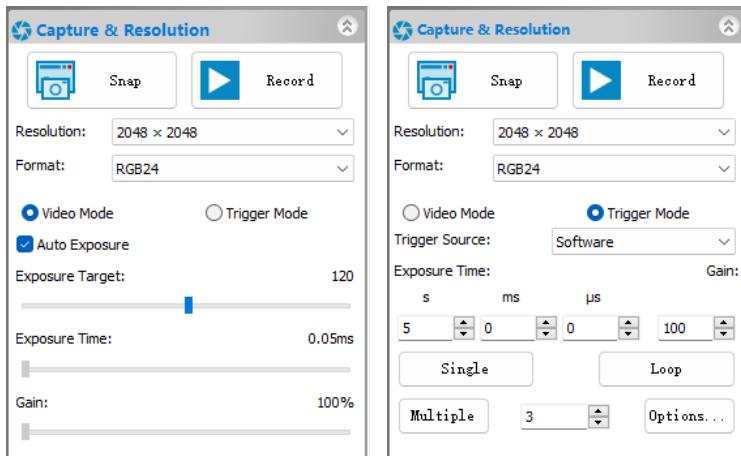


Figure 12-1 Video Mode and Trigger Mode on the Capture & Resolution group in EHDView

After the [Trigger Mode](#) is checked, the [Capture & Resolution](#) group will switch to [Trigger Mode](#) as shown in Figure 12-1 on the right. Where, the [Trigger Source](#), [Exposure Time](#), [Gain](#), [Single](#), [Loop](#), [Multiple](#), [Frame Box](#), and [Options](#) can be set.

### 10.2 Trigger Sources and Their Capture Style

The [Trigger Source](#) can be any external input signal inputted into the camera which is called [Hardware \(Trigger Source\)](#), it can also be a command from the application which is called [Software \(Trigger Source\)](#). For the [Software Trigger Source](#), it can be [Single](#), [Loop](#), [Multiple](#), or [Sequence](#) style. Figure 12-2 shows the possible [Trigger Sources](#). Table 12-1 shows the designed [Trigger Source](#) descriptions and possible capture styles for TouTek camera.

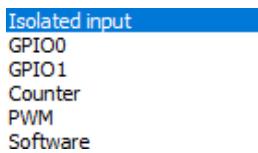


Figure 12-2 Possible Trigger Sources

Table 12-1 Description of possible Trigger Sources and their capture styles

Trigger Source	Description
<a href="#">Isolated input</a>	Logic 0 input level: 0~2.2VDC; Logic 1 input level: 3.3~24VDC; Maximum input current: 30mA;
<a href="#">GPIO0</a>	Logic 0 input level: 0~0.6VDC (DIR_GPIO0/DIR_GPIO1 pins); Logic 1 input level: 2.0~24VDC (DIR_GPIO0/DIR_GPIO1 pins); Maximum input current: 25mA; If <a href="#">GPIO0</a> is chosen as <a href="#">Trigger Source</a> , it should be configurated as <a href="#">Input</a> in the <a href="#">GPIO Mode</a> 's combo box on the <a href="#">Options&gt;IO Control</a> page;
<a href="#">GPIO1</a>	Logic 0 input level: 0~0.6VDC (DIR_GPIO0/DIR_GPIO1 pins); Logic 1 input level: 2.0~24VDC (DIR_GPIO0/DIR_GPIO1 pins); Maximum input current: 25mA; If <a href="#">GPIO1</a> is chosen as <a href="#">Trigger Source</a> , it should be configurated as <a href="#">Input</a> in the <a href="#">GPIO Mode</a> 's combo box on the <a href="#">Options&gt;IO Control</a> page;
<a href="#">Counter</a>	<a href="#">Counter</a> refers to the operation mode in which the camera can divide the frequency of the external input trigger signal through the preset <a href="#">Counter Value</a> and perform image acquisition according to the customer's logic. For example, when the counter value(Counter Value: <input type="text" value="1,1023"/> [1,1023]) is set to 3, the camera needs to receive 3 trigger signals to trigger once;

	<p>When <b>Counter</b> is chosen in <b>Trigger Source</b> combo box in the <b>Capture &amp; Resolution</b> group, the <b>Counter Source</b> can be <b>Isolated input, GPIO0</b> or <b>GPIO1</b> which can be chosen on <b>Options&gt;IO Control</b> page; If <b>GPIO0</b> or <b>GPIO1</b> is chosen in the <b>Counter Source</b> combo box on <b>Options&gt;IO Control</b> page. It should be configured as <b>Input</b> in the <b>GPIO Mode</b> combo box; Check <b>Options&gt;IO Control</b> page's <b>Line Select</b> related items and <b>Counter</b> related items for details;</p>
PWM	<p><b>PWM</b> refers to the operation mode in which the camera exposure time is controlled by the input trigger signal's pulse width;</p> <p><b>PWM Trigger Source</b> can be <b>Isolated input, GPIO0</b> or <b>GPIO1</b>. If <b>GPIO0</b> or <b>GPIO1</b> is chosen in the <b>PWM Source</b> combo box on the <b>Options&gt;IO Control</b> page, it should be configured as <b>Input</b> in the <b>GPIO Mode</b> combo box; Check <b>Options&gt;IO Control</b> page's <b>Line Select</b> related items and <b>PWM</b> related items for details;</p>
Software	<p>When <b>Software</b> trigger is chosen, the client software can send the command through USB3.0 to trigger, acquire and transfer images, In EHDView, <b>Single, Loop, Multiple, or Sequence</b> can be used to send the <b>Software</b> trigger command; If the <b>Plan</b> or <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Multiple</b> button will switch to <b>Sequence</b> button and the camera will use the <b>Exposure Time</b> and <b>Gain</b> in the <b>Sequence table</b> on this page one by one to capture the specified frames. Check <b>Single, Loop, Multiple, or Sequence</b> on <b>Capture &amp; Resolution</b> group for the <b>Software</b> capture operations; Check <b>Options&gt;Sequence</b> page and <b>Options&gt;Advanced</b> page for the related <b>Sequence</b> and <b>Software</b> capture setup options;</p>
Single	<p>When <b>Single</b> is clicked, the camera will start to capture the image. At the same time the <b>Single</b> button will switch to <b>Stop</b> button. Clicking <b>Stop</b> button to stop the current <b>Single</b> capture operation, the <b>Stop</b> button will switch to <b>Single</b> button again for the next capture operation;</p> <p><b>Note:</b> 1) The captured frames will always <b>Show in the video window</b> to prevent too many captures; 2) Enabled when <b>Software</b> in the <b>Trigger Source</b> combo box is chosen or <b>Always enable software trigger</b> checkbox is checked on the <b>Options&gt;Advanced</b> property page;</p>
Loop	<p>When <b>Loop</b> is clicked, the camera will start to capture the image continuously and the <b>Loop</b> button will switch to <b>Stop</b> button. Clicking <b>Stop</b> button to stop <b>Loop</b> captures and the <b>Stop</b> button will switch to <b>Loop</b> button for the next <b>Loop</b> capture operation;</p> <p><b>Note:</b> 1)The captured frames will always <b>Show in the video window</b> to prevent too many captures; 2)Enabled to capture continually when <b>Software</b> in the <b>Trigger Source</b> combo box is chosen or <b>Always enable software trigger</b> checkbox is checked on the <b>Options&gt;Advanced</b> property page;</p>
Multiple	<p><b>Multiple</b> refers to the operation mode in which the camera receives <b>Software</b> trigger signal or command and exports multiple frames of images. An edit box with spin(we call it <b>Frames Box</b>) is designed and affiliated to the <b>Multiple</b> button (Multiple 3 Options...) for the setting of the frames to be captured; The <b>Frames Box</b> can be set in the range of 1~65535. If the <b>Frames Box</b> is 3, a three-frame image will be captured and exported;</p> <p><b>Note:</b> 1)<b>Multiple</b> capture is enabled to capture continually when <b>Software</b> in the <b>Trigger Source</b> combo box is chosen; 2)<b>Multiple</b> capture is enabled when <b>Always enable software trigger</b> is checked on the <b>Options&gt;Advanced</b> property page, no matter whether <b>Trigger Source</b> is <b>Software</b> or <b>Hardware</b> on the <b>Capture &amp; Resolution</b> group; 3) If the <b>Plan</b> or <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Multiple</b> button will switch to <b>Sequence</b> button and the camera will use the <b>Exposure Time</b> and <b>Gain</b> in the <b>Sequence table</b> on this page. The captured frames will be displayed either in <b>Show in the video window</b>, or <b>Show in a new window</b> or <b>Save to disk</b> which can be specified on <b>Options&gt;Output</b> page;</p>
Sequence	<p>When <b>Sequence</b> is clicked, the camera will start to capture the image until the specified frames in the <b>Frames Box</b> are captured. At the same time the <b>Sequence</b> button will switch to <b>Stop</b> button. Clicking <b>Stop</b> button will stop the current <b>Sequence</b> capture and the <b>Stop</b> button will switch to <b>Sequence</b> again for the next <b>Sequence</b> capture operation;</p> <p><b>Note:</b> 1)Switched from <b>Multiple</b> to <b>Sequence</b> to capture the specified frames in the edit box with spin(<b>Frames Box</b>) when <b>Plan</b> or <b>Hardware</b> in the <b>Type</b> combo box is chosen on the <b>Options&gt;Sequence</b> property page; 2)If the <b>Plan</b> or <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Sequence</b> button will be enabled and the capture will use the <b>Exposure Time</b> and <b>Gain</b> in the <b>Sequence table</b> list below one by one on the <b>Options&gt;Sequence</b> page; 3) If the <b>Plan</b> or <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page and <b>Always enable</b></p>

	<p><b>software trigger</b> is checked on the <b>Options&gt;Advanced</b> property page, the <b>Sequence</b> button will not switch to <b>Multiple</b> button and will be enabled only when the still in Sequence enable</p> <p>4) If the <b>Plan</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page and the <b>Software</b> is chosen in the <b>Trigger Source</b> combo box, the <b>Sequence</b> button will be enabled.</p> <p>5) If the <b>Hardware</b> is chosen in the <b>Trigger Source</b> combo box, the <b>Sequence</b> button will be disabled, but the <b>Frame Box</b> will still be enabled and the <b>Sequence</b> will switch to the <b>Hardware Sequence</b> capture. One <b>Hardware</b> trigger signal will capture the specified frames on the <b>Frame Box</b> using the <b>Exposure Time</b> and <b>Gain</b> in the <b>Sequence</b> table on <b>Options&gt;Sequence</b> page;</p> <p>6) Check <b>Options&gt;Sequence</b> page for the related <b>Sequence</b> setup options;</p>
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## 10.3 The trigger capture and IO Control configurations

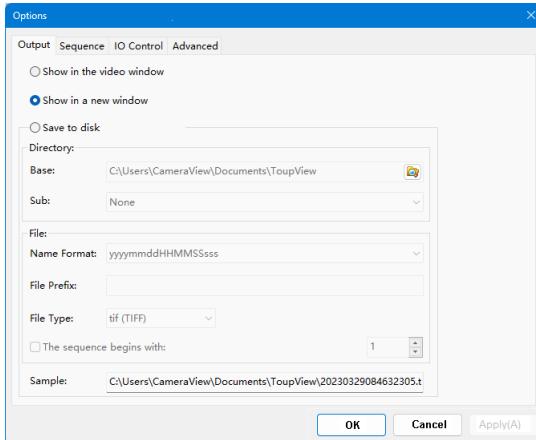


Figure 12-3 Options&gt;Output page

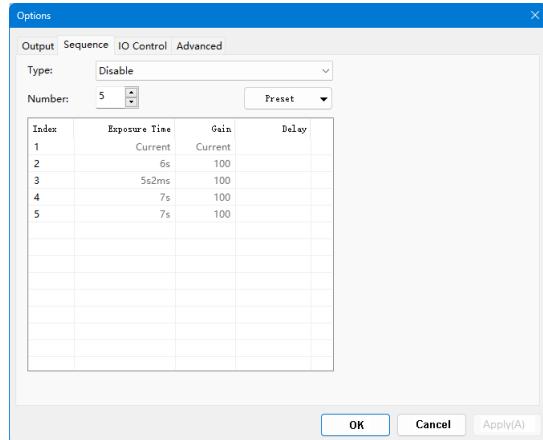


Figure 12-4 Options&gt;Sequence page

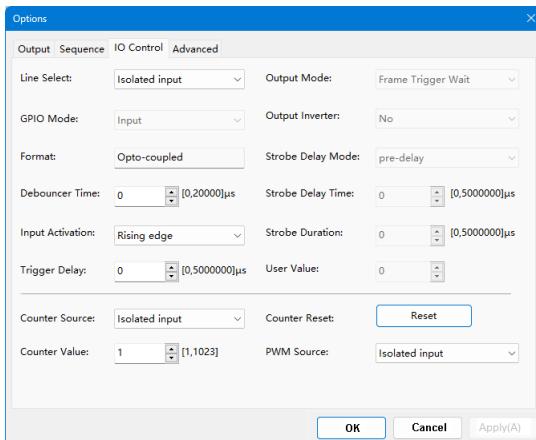


Figure 12-5 Options&gt;IO Control page

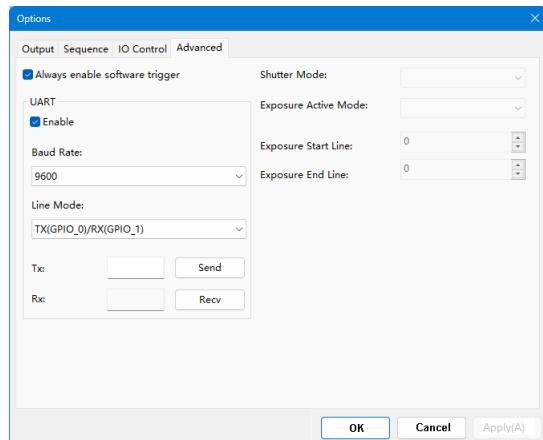


Figure 12-6 Options&gt;Advanced page

The **Trigger Source** can be **Isolated input**, **GPIO0**, **GPIO1**(when configured as input), **Counter**, or **PWM** which can be configurated on the **Options** property sheet. Also the camera's **Isolated output**, **GPIO0** or **GPIO1**(can be configurated as **Output**) can be used as **Output** or **UART** (**GPIO0**, **GPIO1** only) applications. All of these configurations can be realized on the **Options** property sheet described in Table 12-2 below.

About the captured file operation style, one can find it on the **Option>Output** page;

About the **Sequence** setup, one can find it on the **Option>Sequence** page;

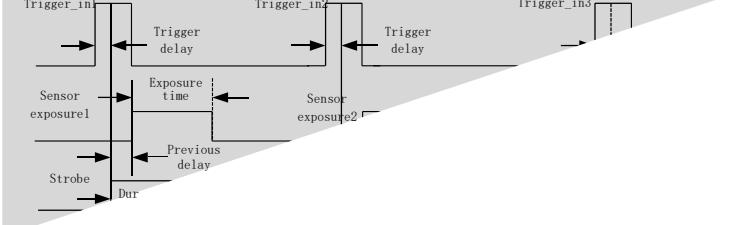
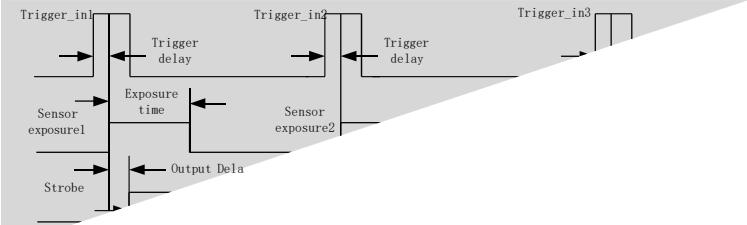
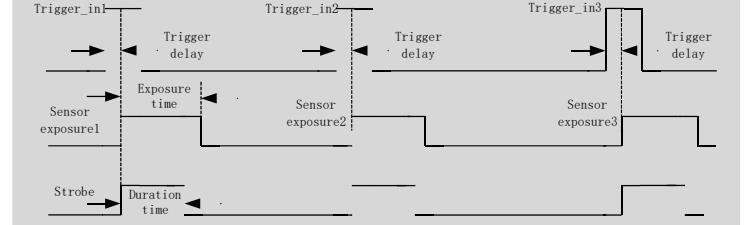
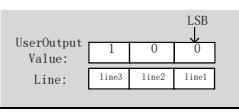
About the camera pin **IO Control** style, one can find it on the **Options>IO Control** page;

About the **Always enable software trigger** and **UART** setup, **Shutter Mode**, and **Exposure Active Mode**, one can find it on the **Options>Advance** page.

Table 12-2 Options property sheet for Trigger Source or camera pin configuration

Pages	Items	Descriptions
Output page	Output Destination	Used to set the captured frame's <b>Output</b> destination, can be <b>Show in the video window</b> , <b>Show in a new window</b> or <b>Save to disk</b> ;
		When <b>Save to disk</b> is checked, the  button will be enabled clicking it to choose the <b>Base</b> directory, clicking the <b>Sub</b> combo box's dropdown button to choose the <b>Sub</b> directory; The <b>File Name Format</b> , <b>File Prefix</b> , <b>File Type</b> , and even <b>The sequence begin with</b> can be chosen, set, or defined. <b>Note:</b> 1)Valid only for <b>Sequence</b> or <b>Multiple</b> capture setup; 2)For <b>Single</b> or <b>Loop</b> capture, the captured image will be always displayed on the video window;
Sequence page	Type Disable Plan Hardware	<b>Disable:</b> If the <b>Disable</b> button is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Sequence</b> button on the <b>Capture &amp; Resolution</b> page will switch to <b>Multiple</b> button;  <b>Plan:</b> 1)If <b>Plan</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Multiple</b> button on the <b>Capture &amp; Resolution</b> group will switch to <b>Sequence</b> button; 2) If the <b>Software Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group or the <b>Always enable software trigger</b> is checked on the <b>Options&gt;Advanced</b> property page, the <b>Sequence</b> button will be enabled After the <b>Software</b> trigger signal is arrived(By clicking <b>Single</b> , <b>Loop</b> , or <b>Sequence</b> button), the camera will capture frames specified in the edit box with spin (we call it <b>Frames Box</b> ) affiliated to the <b>Sequence</b> button; The whole captures will use the <b>Exposure Time</b> , <b>Gain</b> and <b>Delay</b> in the <b>Sequence table</b> list under Number:   one by one by the software; 3) If the <b>Disable</b> button is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Sequence</b> button on the <b>Capture &amp; Resolution</b> page will switch to <b>Multiple</b> button; 4) The <b>Sequence</b> button will be enabled only when a) the <b>Plan</b> in the <b>Type</b> combo box is chosen on the <b>Options&gt;Sequence</b> page and b) he <b>Software Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group or c) <b>Always enable software trigger</b> is checked on the <b>Options&gt;Advanced</b> property page;  <b>Hardware:</b> 1) if <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Multiple</b> button on the <b>Capture &amp; Resolution</b> group will switch to <b>Sequence</b> button and will be disabled for <b>Hardware</b> trigger. But users can still set the frames number in the <b>Frame Box</b> on the <b>Capture &amp; Resolution</b> group; 2) After the <b>Hardware</b> trigger signal arrives, the camera will capture frames specified in the edit box with spin (we call it <b>Frame Box</b> ) affiliated to the <b>Sequence</b> button; The whole capture will use the <b>Exposure Time</b> , <b>Gain</b> ( <b>Delay</b> is not used) in the <b>Sequence table</b> list under Number:   one by one but stored in the camera hardware for the quick operation; 3) If the <b>Disable</b> button is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Sequence</b> button on the <b>Capture &amp; Resolution</b> page will switch to <b>Multiple</b> button. 4) The <b>Sequence</b> button is always disabled if a) The <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page and b)the <b>Hardware Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group; 5) The <b>Sequence</b> button will be enabled if a) the <b>Software Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group or b) the <b>Always enable software trigger</b> checkbox is checked on the <b>Options&gt;Advanced</b> property page, in this case, both the <b>Plan</b> and <b>Hardware Sequence</b> capture are supported;
	Number	The possible <b>Sequence</b> (capture) frames to be captured. If the <b>Number</b> is larger than the <b>Sequence Number</b> in the <b>Frames Box</b> on the <b>Capture &amp; Resolution</b> group, the other <b>Indices</b> will be executed at the next <b>Sequence</b> operation one by one recycled;
	Index	The order of the <b>Number</b> group;
	Exposure Time	The camera <b>Exposure Time</b> for the specified capture <b>Index</b> in the <b>Sequence</b> capture;
	Gain	The camera <b>Gain</b> for the specified capture <b>Index</b> in the <b>Sequence</b> capture;
	Delay	The <b>Delay</b> time for the specified capture <b>Index</b> in the <b>Plan Sequence</b> capture(Valid for <b>Plan Sequence</b> capture only);
	Preset	Choosing <b>Save</b> to save the current <b>Sequence table</b> 's settings; Clicking <b>Management</b> to <b>Rename</b> the saved <b>Sequence table</b> 's setting files or <b>Remove</b> them from the <b>Management</b> list;
IO Control page	Line Select	Choosing which line to set. Can be <b>Isolated input</b> , <b>Isolated output</b> , <b>GPIO0</b> or <b>GPIO1 et al</b> ;
	GPIO Mode	To configure whether the line selected in <b>Line Select</b> is for <b>Input</b> or <b>Output</b> . Only <b>GPIO0</b> or <b>GPIO1</b> can be configured as either <b>Input</b> or <b>Output</b> ; If <b>Isolated input</b> or <b>Isolated output</b> is chosen, the <b>GPIO Mode</b> will be specified as <b>Input</b> or <b>Output</b> (Not configurable) respectively;
	Format	Specify the current selected signal's <b>Format</b> in the <b>Line Select</b> combo box, can be <b>Opto-coupled(Isolated input, Isolated output)</b> or <b>TTL (GPIO0 or GPIO1)</b> for clarity(Unconfigurable);
	Debouncer Time	Since there may be a glitch in the external trigger input signal if it directly enters into the internal logic circuit of the camera, it will cause false triggering, so the input trigger signal should be debounced. In addition, the effective pulse width of the trigger signal input by the user should be greater than the <b>Debouncer Time</b> , otherwise, the trigger signal will be ignored; When <b>Isolated input</b> , <b>GPIO0</b> or <b>GPIO1</b> is chosen in the <b>Line Select</b> combo box and <b>GPIO0</b> or <b>GPIO1</b> is configured as <b>Input</b> in the <b>GPIO Mode</b> combo box, the <b>Debouncer Time</b> will be enabled for the user to input the <b>Debouncer Time</b> between 0 to 20000us;

	<b>Input Activation</b>	<p>When <b>Isolated input</b>, <b>GPIO0</b> or <b>GPIO1</b> is chosen in the <b>Line Select</b> combo box and <b>GPIO0</b> or <b>GPIO1</b> is configured as <b>Input</b> in the <b>GPIO Mode</b> combo box; The <b>Input Activation</b> combo box will be enabled to configure the <b>Input Activation</b> as either <b>Rising Edge</b> or <b>Falling Edge</b>;</p> <p>Also can be configue as <b>high level</b> or <b>low level</b>. When <b>high level</b> is selectd, the camera keeps triggering the frame when the input signal is high; When <b>low level</b> is selectd, the camera keeps triggering the frame when the input signal is low;</p>
	<b>Trigger Delay</b>	<p>When <b>Isolated input</b>, <b>GPIO0</b> or <b>GPIO1</b> is chosen in the <b>Line Select</b> combo box and <b>GPIO0</b> or <b>GPIO1</b> is configured as <b>Input</b> in the <b>GPIO Mode</b> combo box, the <b>Trigger Delay</b> will be enabled for the user to input the <b>Trigger Delay</b> time between 0 to 5000000us;</p> <p>If the <b>Trigger Delay</b> time is set to 1000000us, the camera will wait for 1s to capture the image after receiving the trigger signal;</p>
		<p>When <b>Isolated output</b>, <b>GPIO0</b> or <b>GPIO1</b> is selected in the <b>Line Select</b> combo box and <b>GPIO0</b> or <b>GPIO1</b> is configured as <b>Output</b> in the <b>GPIO Mode</b> combo box, the <b>Output Mode</b> will be enabled. It can be <b>Frame Trigger Wait</b>, <b>Exposure Active</b>, <b>Strobe</b>, <b>User Output</b>, <b>Counter Output</b> or <b>Timer Output</b>. The chosen mode can be used for diversified applications;</p> <p>The <b>Frame Trigger Wait</b> signal is pulled low at the start of exposure and pulled high when the last frame of data is read out. The trigger signal input by the user should be in the valid period. If the user inputs a trigger signal when the signal is low, the trigger signal input at this time will be ignored. The following example is the case when Burst Count = 2, as shown below;</p>
	<b>Output Mode</b> Frame Trigger Wait Exposure Active Strobe User Output Counter Output Timer Output	<p><b>Exposure Active:</b> when this signal is high, it means the sensor is exposing. This signal can be used to control an external mobile device to remain stationary or move at low speed while the camera is at exposure. The timing diagram of the exposure valid signal is shown below;</p> <p>When the relative position of the camera and the object to be photographed changes, you can refer to <b>Exposure Active</b> signal to prevent the captured image from being affected by movement and focus adjustment during the exposure process;</p> <p>When <b>Strobe</b> is chosen, <b>Strobe Delay Mode</b>, <b>Strobe Delay Time</b>, <b>Strobe Duration</b> will be enabled;</p> <p>When <b>User Output</b> is chosen, <b>User Value</b> will be enabled. lines3, line2, line1 are the combination of <b>GPIO1</b>, <b>GPIO0</b> and <b>Isolated output</b> respectively. If <b>User Value</b> is 001, then line <b>GPIO1</b> and <b>GPIO0</b> will be disabled and <b>Isolated output</b> will be enabled;</p>
	<b>Output Inverter</b>	<p>When the <b>CounterOutput</b> is selectd, when the counter value is "m", the camera triggers "m" times to output a signal.</p> <p>When the <b>Timer Output</b> is selectd, the camera keeps output signals. When the <b>Strobe Delay Time</b> is <b>delay</b>, the pulse width of the high level is determined by the <b>Strobe Duration</b>. The pulse width of low level is determined by the <b>Strobe Delay Time</b>.</p> <p>When <b>Isolated output</b>, <b>GPIO0</b> or <b>GPIO1</b> is selected in the <b>Line Select</b> combo box and <b>Output</b> is chosen for <b>GPIO0</b> or <b>GPIO1</b> in the <b>GPIO Mode</b> combo box, the <b>Output Inverter</b> will be enabled to configure the current</p>

		selected line's output as either inverted or not(Yes or No).
	<b>Strobe Delay Mode</b>	Strobe can be used to control external devices such as the strobe, and the effective level duration, delay time, and pre-delay time of the strobe signal can be set; When the <b>Output Mode</b> is <b>Strobe</b> , <b>Strobe Delay Mode</b> will be enabled. It can be <b>pre-delay</b> or <b>delay</b> ;
	<b>Strobe Delay Time</b>	When exposure starts, the strobe does not take effect immediately, and the output is delayed according to the value set by <b>Strobe Delay Time</b> which is between 0 to 5000000us. The <b>Strobe Delay Mode</b> can be <b>pre-delay</b> or <b>delay</b> ; It is described below;  pre-delay:   delay: 
	<b>Strobe Duration</b>	The high level duration of the strobe is determined by the <b>Strobe Duration</b> which is between 0 to 5000000us as shown below; 
	<b>User Value</b>	Users can input a value at <b>User Value</b> edit box with spin to control the line as disable or enable. Enabled when <b>User Output</b> is chosen in the <b>Output Mode</b> combo box. The logical value 0 or 1's combination of <b>GPIO1</b> (line3), <b>GPIO0</b> (line2) and <b>Isolated output</b> (line1); When the output mode is selected as <b>User Output</b> , the user can input a value at <b>User Value</b> edit box to control the corresponding line output with 0 or 1; The value here is only valid for the lower three bits of a binary. For example, when line 1 and line 3 are set to <b>User Output</b> mode, and its <b>User Value</b> is set to 4 ('b100), then line 3 outputs 1, and line 1 outputs 0, as shown below. 
	<b>Counter Source</b>	When <b>Counter</b> is chosen in the <b>Trigger Source</b> combo box in the <b>Capture &amp; Resolution</b> group, the <b>Counter Source</b> can be chosen from <b>Isolated input</b> , <b>GPIO0</b> or <b>GPIO1</b> in this combo box on the <b>Option&gt;IO Control</b> page;
	<b>Counter Value</b>	The <b>Counter Value</b> is used to divide the frequency of the external input trigger signal when the <b>Counter Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group; See <b>Counter</b> in Table 12-1 for detail;
	<b>Counter Reset</b>	Click <b>Reset</b> button can clear the current counting process and begin a new one;
	<b>PWM Source</b>	When <b>PWM</b> is chosen in the <b>Trigger Source</b> combo box in the <b>Capture &amp; Resolution</b> group, the <b>PWM Source</b> can be from <b>Isolated input</b> , <b>GPIO0</b> , or <b>GPIO1</b> in this combo box et al. ;
Advanced page	<b>Always enable software trigger</b>	When this button is checked, no matter whether <b>Trigger Source</b> is <b>Software</b> or <b>Hardware</b> , the software trigger buttons( <b>Single</b> , <b>Loop</b> , <b>Multiple</b> ) are always enabled; If the <b>Plan</b> or <b>Hardware</b> is chosen in the <b>Type</b> combo box on the <b>Options&gt;Sequence</b> page, the <b>Multiple</b> button will switch to <b>Sequence</b> button; The <b>Sequence</b> button will be enabled if a)the <b>Software Trigger Source</b> is chosen in the <b>Capture &amp; Resolution</b> group or b) the <b>Always enable software trigger</b> checkbox is checked on the <b>Options&gt;Advanced</b> property page, in this case, both the <b>Plan</b> and <b>Hardware Sequence</b> captures are supported;
	<b>UART</b>	There is a serial port function on the <b>Advanced</b> page, which can be used to communicate with external devices via serial port. Check <b>Enable</b> to enable this function. When enabled, <b>GPIO0</b> and <b>GPIO1</b> can only be used as <b>UART</b> transfers;

		The <b>Baud Rate</b> supports 9600-115200. <b>Cable Select</b> can configure <b>GPIO0</b> and <b>GPIO1</b> , which can be configured as <b>TX</b> or <b>RX</b> respectively. Setting a value at <b>TX</b> , clicking <b>Send</b> to send the set value out; click <b>Accept</b> at <b>RX</b> to receive the value from the external device;
	<b>Shutter Mode</b>	Enabled if the camera supports. Users can select <b>Rolling Shutter</b> or <b>Global Reset</b> ;
	<b>Exposure Active Mode</b>	Enabled if the camera supports. Users can select <b>Specified lines</b> or <b>Common exposure time</b> ;
	<b>Exposure Start Line</b>	Enabled when <b>Specified lines</b> in the <b>Exposure Active Mode</b> combo box is selected. To configure when the Exposure Active signal is valid;
	<b>Exposure End Line</b>	Enabled when <b>Specified lines</b> in the <b>Exposure Active Mode</b> combo box is selected. To configure when the Exposure Active signal is invalid;

## 11 Cooling

For the SWIR series cameras, there is a [Cooling](#) group on the left sidebar in EHDView. To enable the [Cooling](#) function, an external 12V power supply is required. By default, the [TEC](#) is turned on. One can set the [Target Temperature](#). After entering the value, click "Apply", and the sensor temperature will gradually approach to the [Target Temperature](#). At the same time, EHDView can display the current temperature in real time. And the cooling effect can reach about 10-25 degrees lower than the ambient temperature, as shown in Figure 13-1.

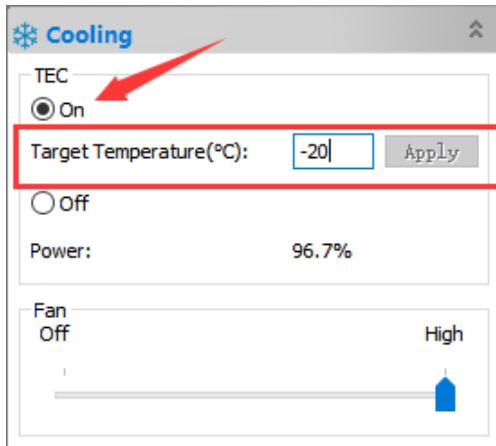


Figure 13-1 TEC settings

The [Fan](#) has two gears from [Off](#) to [High](#). When [High](#), the [Fan](#) speed reaches the highest. When [Off](#), the [Fan](#) is turned off, the [TEC](#) is also turned off, and the power is 0, as shown in Figure 13-2.

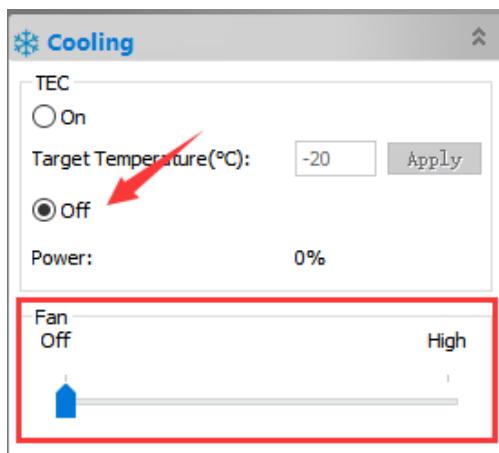


Figure 13-2 Fan settings

When the [TEC](#) is turned on, the [Fan](#) will automatically turn on preventing the abnormal situation such as the housing temperature is too high if the [Fan](#) stops running when the [TEC](#) is working; when the [Fan](#) is turned off, the [TEC](#) will automatically turn off.

## 12 Application

### 12.1 Application installation

In terms of software, customers are welcome to visit our website: <https://www.ehd.de/products/driver/driver.htm> to download the latest EHDView, also be used with ASCOM, DirectShow interface. If the third-party software is compatible with these interfaces, customers can also download software drivers from our website and install them into the third-party software.

### 12.2 Introduction to EHDView

EHDView is a professional software that integrates camera control, image acquisition and processing, image browsing and analysis functions. EHDView has the following characteristics:

- x86: XP SP3 and above ; CPU supports SSE2 and above
- x64: Win7 and above
- Support video mode and Trigger Mode (Raw format or RGB format)
- Automatic capture and quick recording capabilities
- Supports multiple languages
- Hardware ROI and digital binning capabilities
- Rich image processing functions, such as image stitching, real-time overlay, flat field correction, dark field correction, etc.
- Supports all EHD SC, SCA, SCM, MaxCam cameras

#### 12.2.2 User interface design

- The menus and toolbars are properly set to ensure quick operation
- Professionally integrated with 5 sidebars - Camera, Folders, Undo/Redo, Layers, Measure
- Comfortable operation method (double-click or right-click context menu)
- Detailed help manual

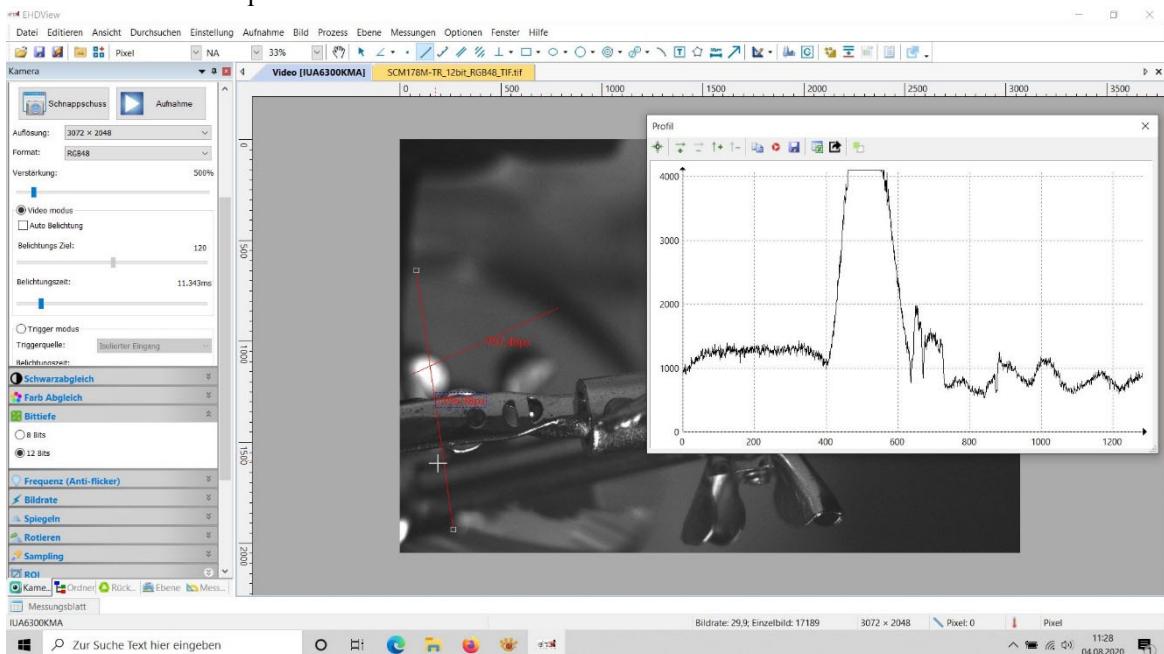


Figure 14-1 EHDView video window

#### 12.2.3 Professional Camera Control Sidebar

Capture & Resolution	Set up live and still capture, snap images, or record video
Exposure & Gain	Auto exposure (preset exposure target value), manual exposure (exposure time can be manually entered and set by slider); gain up to 5 times
White Balance	Advanced one-click smart white balance settings, and you can adjust white balance by manually setting

	color temperature and color
Color Adjustment	Color, saturation, brightness, contrast, gamma initial high-speed adjustment function
Frame Rate Control	For different computer and USB performance, the camera can be super compatible by adjusting the frame rate
Flip	Select "Horizontal" or "Vertical" to adjust the sample orientation to ensure the same orientation as the visual system
Sampling	Neighborhood averaging can improve the signal-to-noise ratio of the video stream; while the sampling extraction mode can ensure the sharpness of the video stream. Supports histogram expansion of video stream, image negative and positive switching, grayscale calibration, and sharpness factor calculation to facilitate video focusing
Bit Depth	8, 12-bit switching, 8-bit is the basic Windows image format. 12-bit has higher image quality but reduces frame rate
Roi	ROI, Region of interest. This function can set the ROI value of the video window. After the ROI group is expanded, a rectangular box will appear in the middle of the video window, and the ROI can be changed. The mouse can adjust the size of the ROI. If there is no problem with the ROI, click "Apply" to set the video to the size of the ROI, and the default value will be restored to the original size.
Dark Field Correction	To enable darkfield correction, you should first capture a field image, then click Enable. Check Enable to enable darkfield correction. Uncheck it to disable darkfield correction
Cooling	Set TEC Target Temperature, fan on/off
Parameter Save	Load, save, overwrite, load, export custom camera panel controls (including calibration information, exposure parameters and color settings information, etc.)

#### 12.2.4 Professional and practical image processing functions

Video Function	Various video professional processing functions: video broadcasting, timing capture, video recording, video watermarking, watermark mobile alignment, watermark rotation alignment, video grid overlay, video measurement, video scaling, gray scale calibration, video high dynamic (HDR), video depth of field extension, video image stitching, video scale, date, etc.
Image Processing and Enhancement	Image contrast control and adjustment, image denoising, various image filtering algorithms, image mathematical morphology algorithms, image rotation, image scaling and image printing, etc.
Image Overlay	The EHDView image overlay denoising function introduces advanced image matching technology. Users only need to record a short video of the image to be superimposed, and they can superimpose and output high fidelity in the case of displacement, rotation and magnification change between multiple frames of the video. images, easy to use

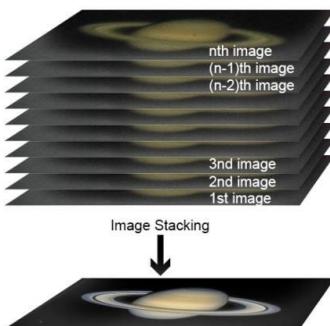


Figure 14-2 Image overlay denoising

#### 12.2.5 Super compatibility

Camera Video Interface	Provide Twain, DirectShow, Labview, SDK installation package (native C++, C#)
Supported Platform and architectures	Compatible with Microsoft® Windows® XP / Vista / 7 / 8/10 /11(32 & 64 bit), Mac OSX, Linux
Language Support	Language support can be added manually, currently supports English, Simplified Chinese, Traditional Chinese, German, Japanese, Russian, French, Italian, Polish, Turkish

#### 12.2.6 Basic hardware requirements

PC Basic Configuration Requirements	CPU: Intel Core 2 2.8GHz or higher
	RAM: 2GB or more
	USB Port: USB3.0 / USB 2.0
	Monitor: 17" or higher
	CD-ROM

## 13 Software development instructions

### 13.1 SDK description

The download link of the SDK is as follows:

<https://www.ehd.de/products/driver/driver.htm>

#### 13.1.1 SDK support platform

- Win32:
  - x86: XP SP3 and above; the CPU needs to support at least the SSE2 instruction set.
  - x64: Win7 and above.
  - arm: Win10 and above.
  - arm64: Win10 and above.
- WinRT: x86, x64, arm, arm64; Windows 10 and above.
- macOS: x86 and x64 bundle; macOS 10.10 and above.
- Linux: core 2.6.27 and above.
  - x86: The CPU needs to support at least the SSE3 instruction set; GLIBC 2.8 and above.
  - x64: GLIBC 2.14 and above.
  - armel: GLIBC 2.17 and above; compiled by toolchain arm-linux-gnueabi (version 4.9.2).
  - armhf: GLIBC 2.17 and above; compiled by toolchain arm-linux-gnueabihf (version 4.9.2).
  - arm64: GLIBC 2.17 and above; compiled by toolchain aarch64-linux-gnu (version 4.9.2).
- Android: arm, arm64, x86, x64; compiled by android-ndk-r18b.

#### 13.1.2 Introduction to SDK content

EHD series cameras support a variety of APIs, including: Native C/C++, .NET/C#/VB.NET, Python, Java, DirectShow, Twain, LabView, Matlab, etc. Compared with other APIs, Native C/C++ API as a low-level API is characterized by using pure C/C++ development without relying on other runtime libraries. The interface is simple and the control is flexible. This SDK zip package contains all the resources and information needed. The directory is as follows:

- inc:
  - nncam.h, the C/C++ header file.
- win: Microsoft Windows platform file
  - ◆ dotnet:
    - nncam.cs, supports C#. nncam.cs uses P/Invoke to call nncam.dll. Please copy nncam.cs to your C# project for use.
  - ◆ x86:
    - nncam.lib, x86 lib file.
    - nncam.dll, x86 dynamic library file.
    - democpp.exe, x86 C++ demo execute the procedure.
  - x64:
    - nncam.lib, x64 lib file.
    - nncam.dll, x64 dynamic library file.
    - democpp.exe, x64 C++ demo execute the procedure.
  - arm:
    - nncam.lib, arm lib file.

nncam.dll, arm dynamic library file.

- arm64:  
nncam.lib, arm64 lib file.

nncam.dll, arm64 dynamic library file.

- winrt:

They can be applied for Dynamic library files of WinRT/ UWP (Universal Windows Platform)/ Windows Store App. They are compatible with Windows Runtime and can be referenced by Universal Windows Platform apps. If you use C# to develop UWP, you can use the nncam.cs wrapper class.

Please pay attention to the Device Capability of uwp. Refer to how to add USB device capabilities to the app manifest. (Microsoft seems to limit the Device entry under DeviceCapability to no more than 100) demouwp.zip is a simple example of uwp. Please modify vid and pid. under DeviceCapability in the file Package.appxmanifest before compiling the run example.

- Drivers: (Cameras produced after 2017.1.1 support WinUSB, and drivers no longer need to be installed on Windows 8 and above)

The x86 folder contains the x86 kernel-mode driver files, including toupcam.cat, toupcam.inf and toupcam.sys.

The x64 folder contains the x64 kernel-mode driver files, including toupcam.cat, toupcam.inf and toupcam.sys.

- samples:

1. democpp, C++ example. This example demonstrates enumerating devices, opening devices, previewing videos, capturing images, setting resolution, triggering, saving images to files in various image formats (.bmp,.jpg,.png, etc.), wmv format video recording, Trigger ModeTrigger Mode, IO control and so on. This example uses the Pull Mode mechanism. To keep the code clean, the WTL library used by the examples can be downloaded from this link <http://sourceforge.net/projects/wtl/>.

2. demopush, C++ example, using the Push Mode mechanism, StartPushModeV3.

3. demomfc, a simple C++ example, uses MFC as a GUI library, supports opening devices, previewing videos, capturing images, setting resolution, saving images to files in various image formats (.bmp,.jpg,.png, etc.), etc. This example uses the Pull Mode mechanism.

4. demowinformcs1, take C# winform for example, it supports opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism, StartPullModeWithWndMsg.

5. demowinformcs2, take C# winform for example, it supports opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism, StartPullModeWithCallback.

6. demowinformcs3, take C# winform for example, it supports opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Push Mode mechanism, StartPushMode.

7. demowinformvb, take VB.NET winform for example, it supports opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism.

- linux: Linux platform files

Udev: 99-toupcam.rules, udev rule file.

Please refer to: [http://reactivated.net/writing\\_udev\\_rules.html](http://reactivated.net/writing_udev_rules.html).

- #: nncam.cs, Support. Net Core C#. nncam.cs uses P/Invoke to call libnncam.so. Please copy nncam.cs to your C# project for use.
- x86: libnncam.so, x86 version so file.
- x64: libnncam.so, x64 version so file.
- armel: libnncam.so, armel version so file, toolchain is arm-linux-gnueabi.
- armhf: libnncam.so, armhf version so file, toolchain is arm-linux-gnueabihf.

- arm64: libnncam.so, arm64 version so file, toolchain is aarch64-linux-gnu.
- android: libnncam.so for four architectures of Android platform arm, arm64, x86, x64.
- mac: macOS platform files.
- python: nncam.py and example code.
- java: nncam.java and example code (console and Swing).
- doc: SDK usage documentation, Simplified Chinese, English.
- sample:
- de emosimplest, the simplest example, is about 60 lines of code.
- demoraw, RAW data and still shots, about 120 lines of code.
- extras:
- directshow: DirectShow SDK and demo program.
- twain: TWAIN SDK.
- labview: Labview SDK and demo program.
- matlab: MatLab demo program.

