

**iRAYPLE**

## LINE SCAN INDUSTRIAL CAMERA

L5000 Series



Empowering Intelligent Manufacturing and Business Efficiency

\* Design and specifications are subject to change without notice.

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Ver. 1, Dec. 2023

Multiple ISP and Algorithm Processing Technologies

Designed for the Photovoltaic, EV Battery, Flat Panel Display  
Printing Industries and others

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## HIGHLY STABLE AND WIDELY APPLICABLE

Meet the Needs of A Wide Variety of Scenes for Line Scan Cameras



iRAYPLE

FPN

TDI

Space  
Calibration

Bayer  
Demosaicing

## ISP PROCESSING ALGORITHMS

Provide Superior Image Performance

## FAST TRANSMISSION

Meet the Needs of High-speed Production Lines

33 85 457 6 067-4  
RIV D-DB Sgns 692(AAE S113)



## HIGHLY STABLE AND WIDELY APPLICABLE

Meet the Needs of A Wide Variety of Scenes for Line Scan Cameras

- Highly stable
- 2K, 4K, 8K and 16K resolutions
- GigE, Camera Link, 10 GigE and CXP-6
- C-mount 2K and 4K cameras
- With its small dimensions, it can be easily installed in narrow spaces



## Multiple Interfaces and Resolutions

- 2K to 16K resolutions
- GigE, Camera Link, 10 GigE and CXP-6



## Easy Installation

The 2K and 4K line scan cameras have C-mount lenses and are small in dimensions, making them suitable for narrow spaces.



VS



✗

## High Stability

Built to withstand harsh environments, all the cameras can be used in environments with low and high temperatures, and strong vibrations.





iRAYPLE



## ISP PROCESSING ALGORITHMS

Provide Superior Image Performance.

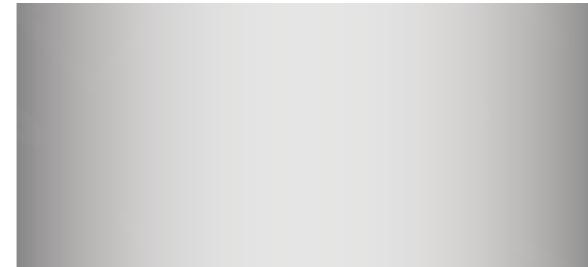
Displays high-quality images in great detail by using FPN Calibration, Bayer Demosaicing, space calibration and TDI.

L5000 SERIES | LINE SCAN INDUSTRIAL CAMERA

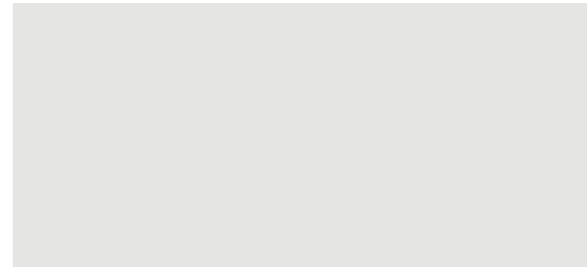


### Lens Shading Correction (LSC)

Lens Shading Correction (LSC) is used to correct the relative illumination of the lens in the imaging system, the uniformity of the external light source and the relative angle, so that the overall brightness of the image is relatively uniform.



Before Optimization



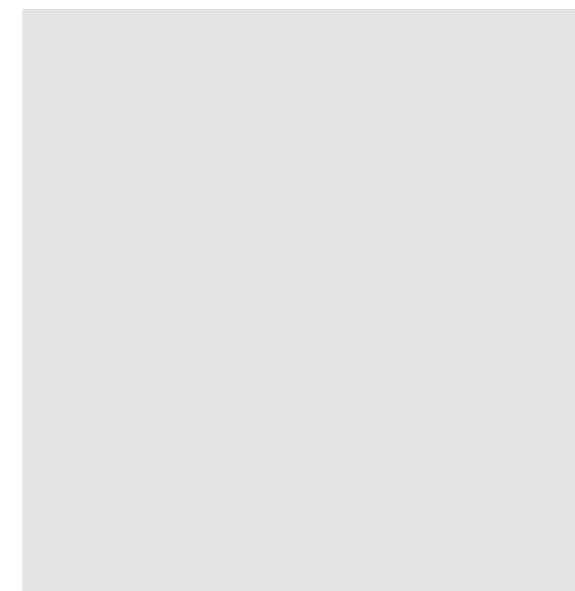
After Optimization

### Image Balancing with FPN Calibration

Solves issues such as uneven illumination, inconsistent response between the lens center and lens edge, and fixed pattern noise.



Before Optimization



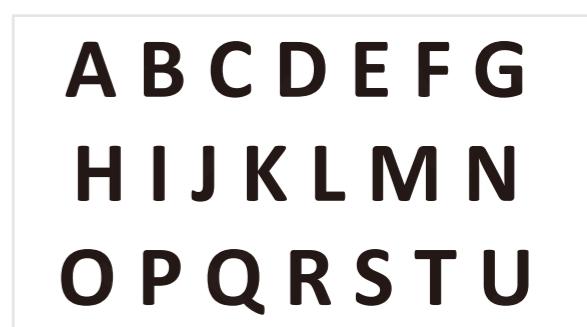
After Optimization

### Sharp Images with Space Calibration

Solves the edge dispersion problem to improve image quality.



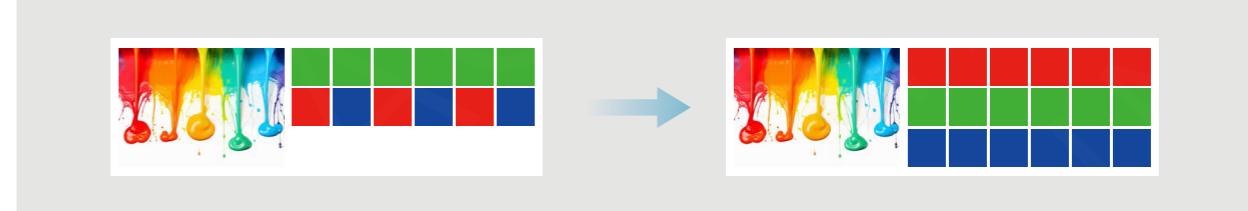
Before Optimization



After Optimization

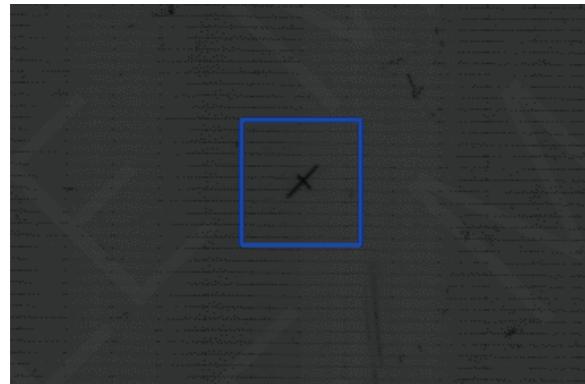
### Color Restoration with Bayer Demosaicing

Fills in the missing color values of each pixel by analyzing the colors of surrounding pixels based on the visible light spectrum.

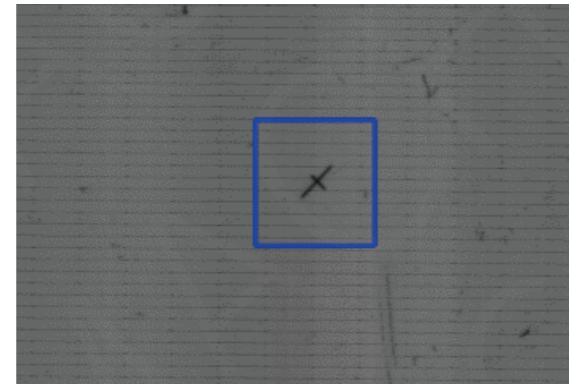


## Reduced Algorithm Processing with TDI

The contrast can be adjusted to brighten images, making it easier to spot defects.



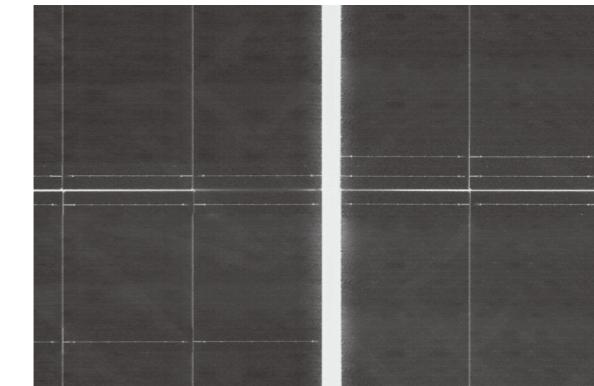
1-Line



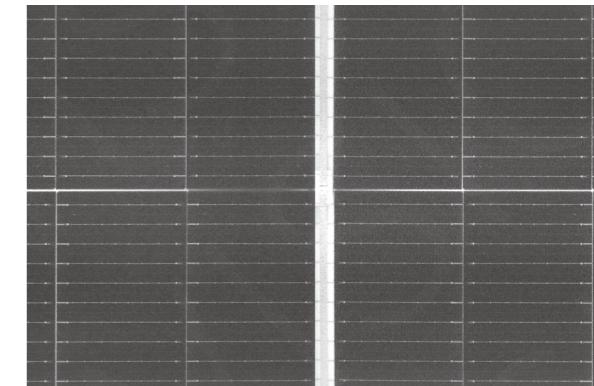
2-TDI

## Exposure Polling to Achieve HDR

HDR: High Dynamic Range. The main role of HDR is to make a image more adaptable to the lighting of different areas of the object, so that each area can be clearly imaged.



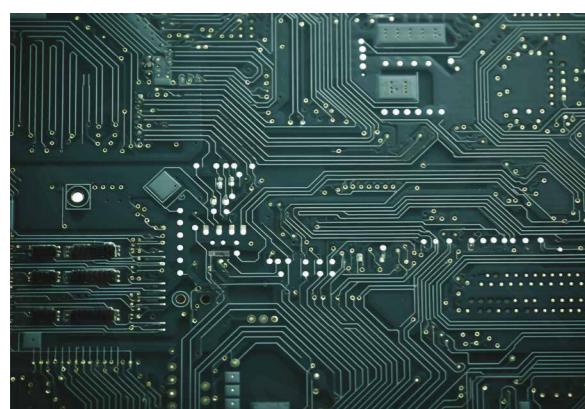
Before Optimization



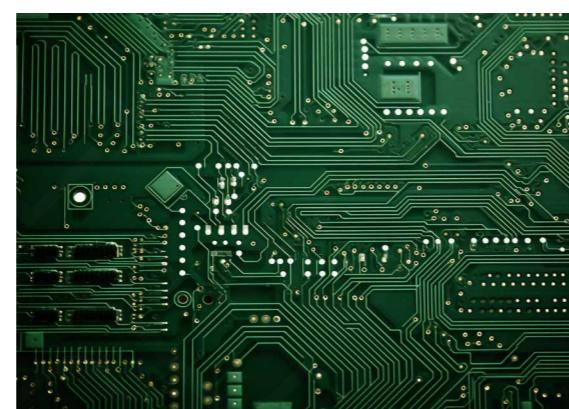
After Optimization

## CCM- Color Correction Matrix, Color Reproduction is Higher

CCM- Color Correction Matrix, generally with a 3x3 transformation matrix, the color of the image is transformed to the target value, so that the color reproduction is closer to the real.



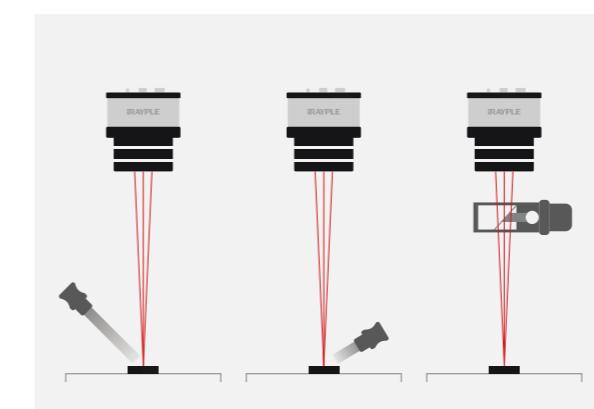
Before Optimization



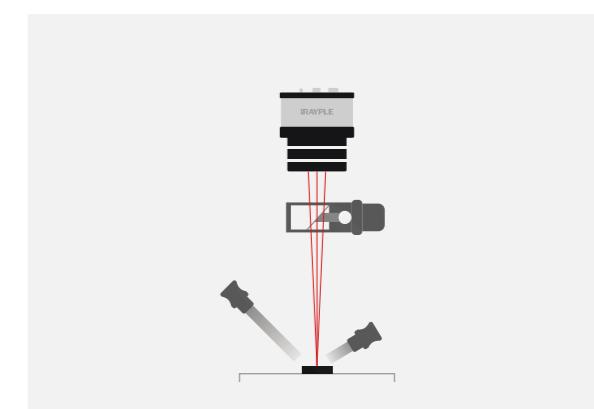
After Optimization

## Time-division Strobe, Efficient Cost Reduction

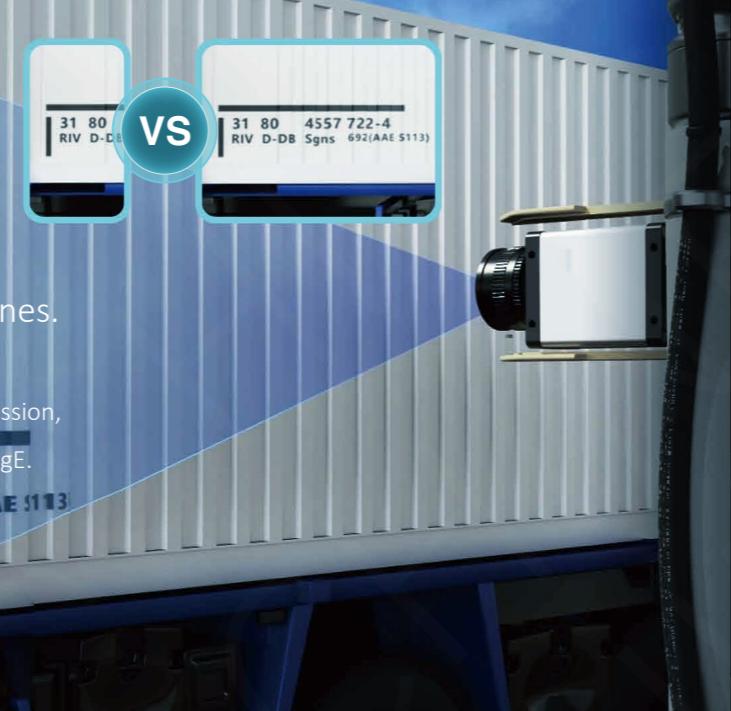
Time-division strobe, for each line exposure, user can switch between different camera parameter configurations or external light source configurations, and then combine the row data of the same configuration into a single frame image.



Traditional : 3 cameras



time-division strobe:1 camera



## FAST TRANSMISSION

Meet the Needs of High-speed Production Lines.

Line scan cameras with network ports support lossless compression, binning and ROI, improving the bandwidth utilization rate in GigE.

33 85 457 6 067-4  
RIV D-DB Sgns 692(AAE S113)

## APPLICATIONS



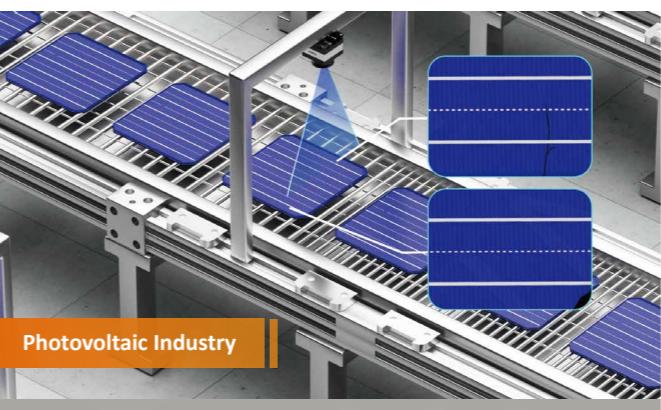
EV Battery Industry



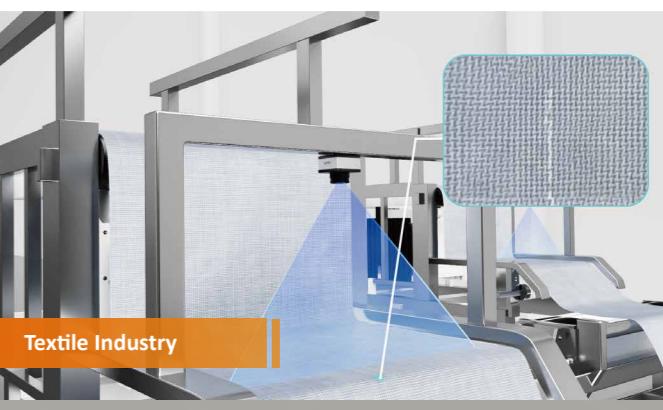
Printing Industry

EV Battery Coating and Die Cutting Inspection

Printing Quality Inspection



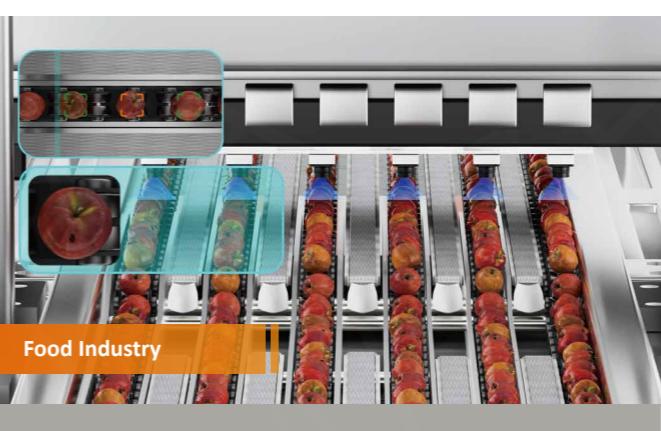
Photovoltaic Industry



Textile Industry

Battery Cell Inspection

Textile Quality Inspection



Food Industry



Liquid Crystal Industry

Fruit and Vegetable Sorting

Glass Panel Inspection

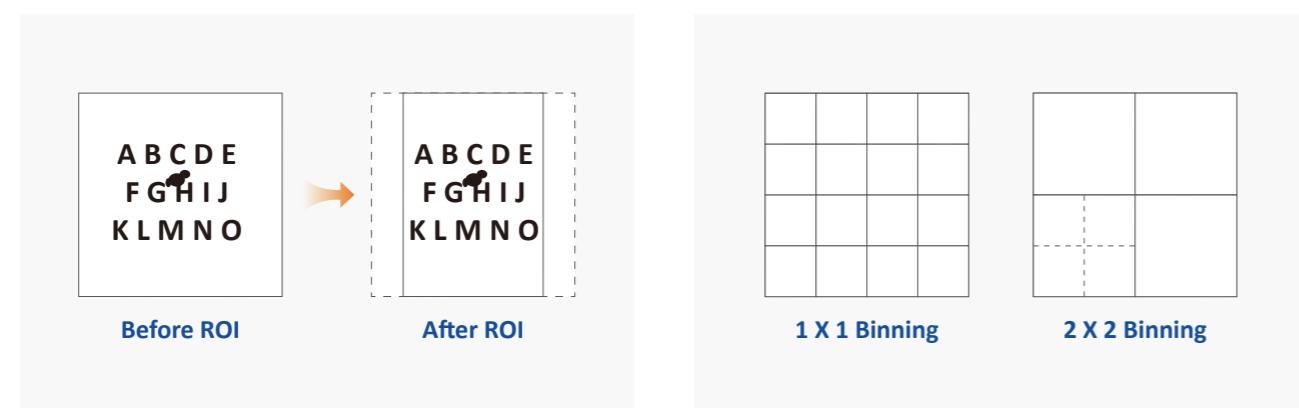
## Increased Line Rate with Lossless Compression

The overall line rate improves 1.5–2.5 times when lossless compression is used, which decreases the limit of network bandwidth.



## Increased Line Rate with ROI and Binning

Binning and ROI give priority to speed over resolution to meet the requirements of high-speed applications.



Before ROI

After ROI

1 X 1 Binning

2 X 2 Binning

## Specifications

L5000 Series				
Model	L5027MG140E	L5027CG140E	L5027MG400E	L5027CG300E
Sensor	2K	2K	2K	2K
Image Sensor	CMOS	CMOS	CMOS	CMOS
Shutter	Global	Global	Global	Global
Resolution	2048 × 2	2048 × 2	2048 × 4	2048 × 3
Line Rate	49 kHz	49 kHz	59 kHz	44.7 kHz
Bit Depth	12	12	12	12
Mono/Color	Mono	Color	Mono	Color
Pixel Size	14 μm × 14 μm	14 μm × 14 μm	7 μm × 7 μm	7 μm × 7 μm
S/N Ratio	39 db	39 db	39.6 db	39.6 db
WDR	66 db	66 db	65.5 db	65.5 db
Image Format	Mono8/10/12/10Packed/12Packed	BayerRG8/BayerRG10/BayerRG12/RGB8Packed/YUV422Packed	Mono8/10/12/10Packed/12Packed	Mono8/BayerRG8/10/12/10P/12P/RGB8P/YUV422
Binning	Support	N/A	Support	Support
ROI	Support	Support	Support	Support
X Flip	Support	Support	Support	Support
Gain	1–32	1–32	1–32	1–32
Gamma	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT
Exposure Time	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms
Trigger Mode	Software Trigger/Hardware Trigger/Free Run Mode	Software Trigger/Hardware Trigger/Free Run Mode	Software Trigger/Hardware Trigger/Free Run Mode	Software Trigger/Hardware Trigger/Free Run Mode
FPN	Support	Support	Support	Support
Interface	GigE	GigE	GigE	GigE
Lens Mount	M42	M42	C	C
Power Consumption	4.5 W	4.5 W	4.6 W	4.6 W
Appearance Dimension Diagram	B	B	A	A
Connector Pin-out	a	a	a	a

## Specifications

L5000 Series									
Model	L5047MG140E	L5047CG140E	L5047MK140E	L5047CK140E	L5047MK141E	L5047CK141E	L5047MG100E		
Sensor	4K	4K	4K	4K	4K	4K	4K		
Image Sensor	CMOS	CMOS	CMOS	CMOS	CMOS	CMOS	CMOS		
Shutter	Global	Global	Global	Global	Global	Global	Global		
Resolution	4096 × 2	4096 × 2	4096 × 2	4096 × 2	4096 × 2	4096 × 2	4096 × 2		
Line Rate	28 kHz	28 kHz	120 kHz	62 kHz	180 kHz	92 kHz	29 kHz		
Bit Depth	12	12	12	12	12	12	12		
Mono/Color	Mono	Color	Mono	Color	Mono	Color	Mono		
Pixel Size	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm	7 μm × 7 μm	3.5 μm × 3.5 μm		
S/N Ratio	39 db	39 db	39.4 db	39.4 db	39.4 db	39.4 db	39.6 db		
WDR	66 db	66 db	66 db	66 db	66 db	66 db	65.5 db		
Image Format	Mono8/10/12/10Packed/12Packed	BayerRG8/BayerRG10/BayerRG12/RGB8Packed/YUV422Packed	Mono8/10/12/10Packed/12Packed	Mono8/BayerRG8/10/12/10P/12P/RGB8P/YUV422	Mono8/10	BayerRG8, RGB8	Mono8/10	BayerRG8, RGB8	Mono8/10/12/10Packed/12Packed
Binning	Support	Support	Support	Support	Support	Support	Support	Support	
ROI	Support	Support	Support	Support	Support	Support	Support	Support	
X Flip	Support	Support	Support	Support	Support	Support	Support	Support	
Gain	1–32	1–32	1–32	1–32	1–32	1–32	1–32	1–32	
Gamma	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	
Exposure Time	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	8 μs–100 ms	
Trigger Mode	Software Trigger/Hardware Trigger/Free Run Mode								
FPN	Support	Support	Support	Support	Support	Support	Support	Support	
Interface	GigE	GigE	Camera Link	Camera Link	Camera Link	Camera Link	Camera Link	GigE	
Lens Mount	M42	M42	M42	M42	M42	M42	M42	C	
Power Consumption	4.5 W	4.5 W	4.5 W	4.5 W	4.5 W	4.5 W	4.5 W	4.2 W	
Appearance Dimension Diagram	B	B	E	E	E	E	E	A	
Connector Pin-out	a	a	b	b	b	b	a		

## Specifications

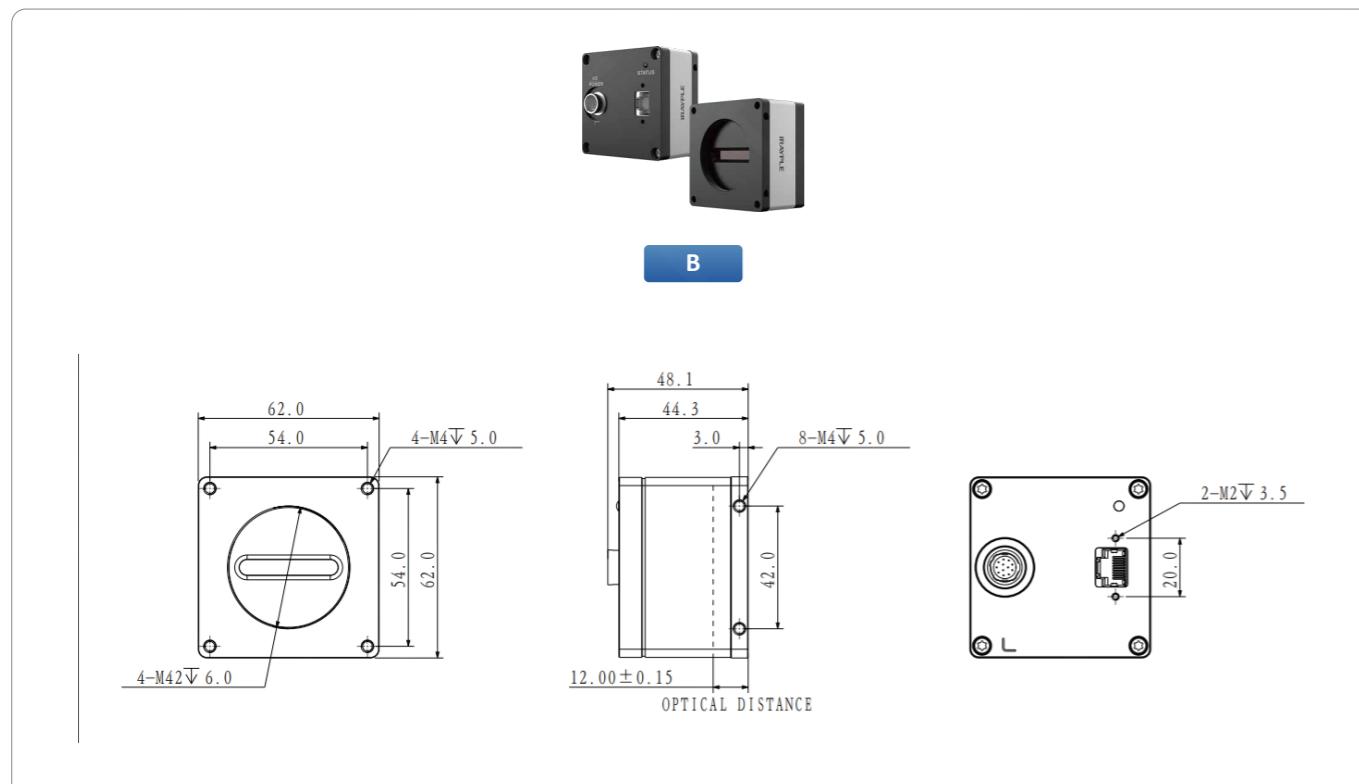
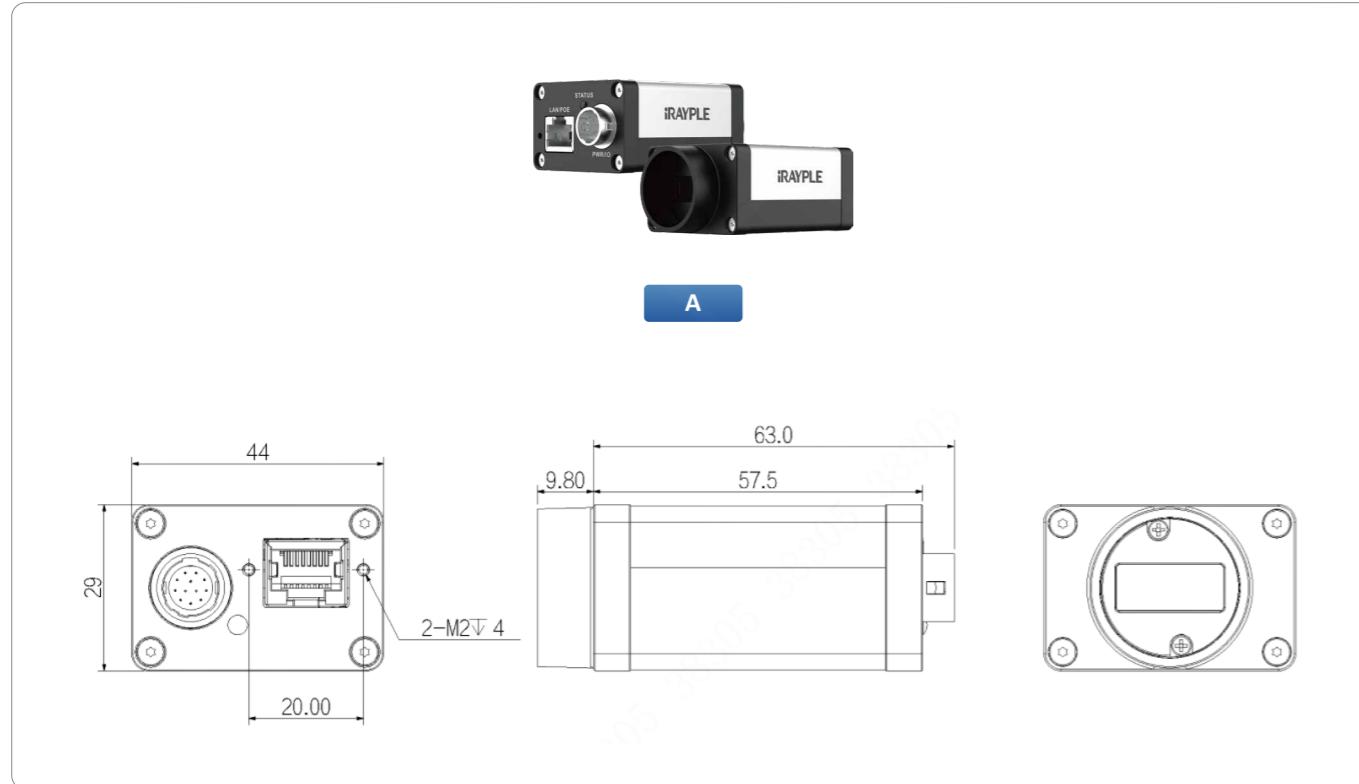
L5000 Series						
Model	L5082MG170E	L5082MK170E	L5087MK470E	L5087CK670E	L5087MT270E L5087CT370E	L5087MKA70E L5087CKA70E
Sensor	8K	8K	8K	8K	8K	8K
Image Sensor	CMOS	CMOS	CMOS	CMOS	CMOS	CMOS
Shutter	Global	Global	Global	Global	Global	Global
Resolution	8192 × 1	8192 × 1	8192 × 4	8192 × 6	8192 × 2 / 8192 × 3	8192 × 4 / 8192 × 6
Line Rate	13 kHz	80 kHz	100 kHz	34 kHz	148.8 kHz / 50kHz	100 kHz / 34kHz
Bit Depth	12	12	10	10	12	10
Mono/Color	Mono	Mono	Mono	Color	Mono / Color	Mono / Color
Pixel Size	7 μm × 7 μm	7 μm × 7 μm	5 μm × 5 μm	5 μm × 5 μm	7 μm × 7 μm	5 μm × 5 μm
S/N Ratio	46 db	46 db	40 db	40 db	37.4 db	40 db
WDR	65.9 db	65.9 db	62 db	62 db	56.6 db	62 db
Image Format	Mono8/10/12/ 10Packed/12Packed	Mono8/10/12	Mono8/10	RGB8	Mono:Mono8/10/12 Color:RGB8	Mono:Mono8/10 Color:RGB8
Binning	Support	Support	Support	Support	Support	Support
ROI	Support	Support	Support	Support	Support	Support
X Flip	Support	Support	Support	Support	Support	Support
Gain	1–32	1–32	1–32	1–32	1–32	1–32
Gamma	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT	From 0 to 4, support LUT
Exposure Time	2 μs–100 ms	2 μs–100 ms	3 μs–100 ms	3 μs–100 ms	3 μs–100 ms	3 μs–100 ms
Trigger Mode	Software Trigger/Hardware Trigger/Free Run Mode					
FPN	Support	Support	Support	Support	Support	Support
Interface	GigE	Camera Link	Camera Link	Camera Link	10 GigE	Camera Link
Lens Mount	M72	M72	M72	M72	M72	M72
Power Consumption	6 W	5 W	11.5 W	12 W	16 W	11.5 W / 12W
Appearance Dimension Diagram	C	H	F	F	D	G
Connector Pin-out	c	b	b	b	d	d

## Specifications

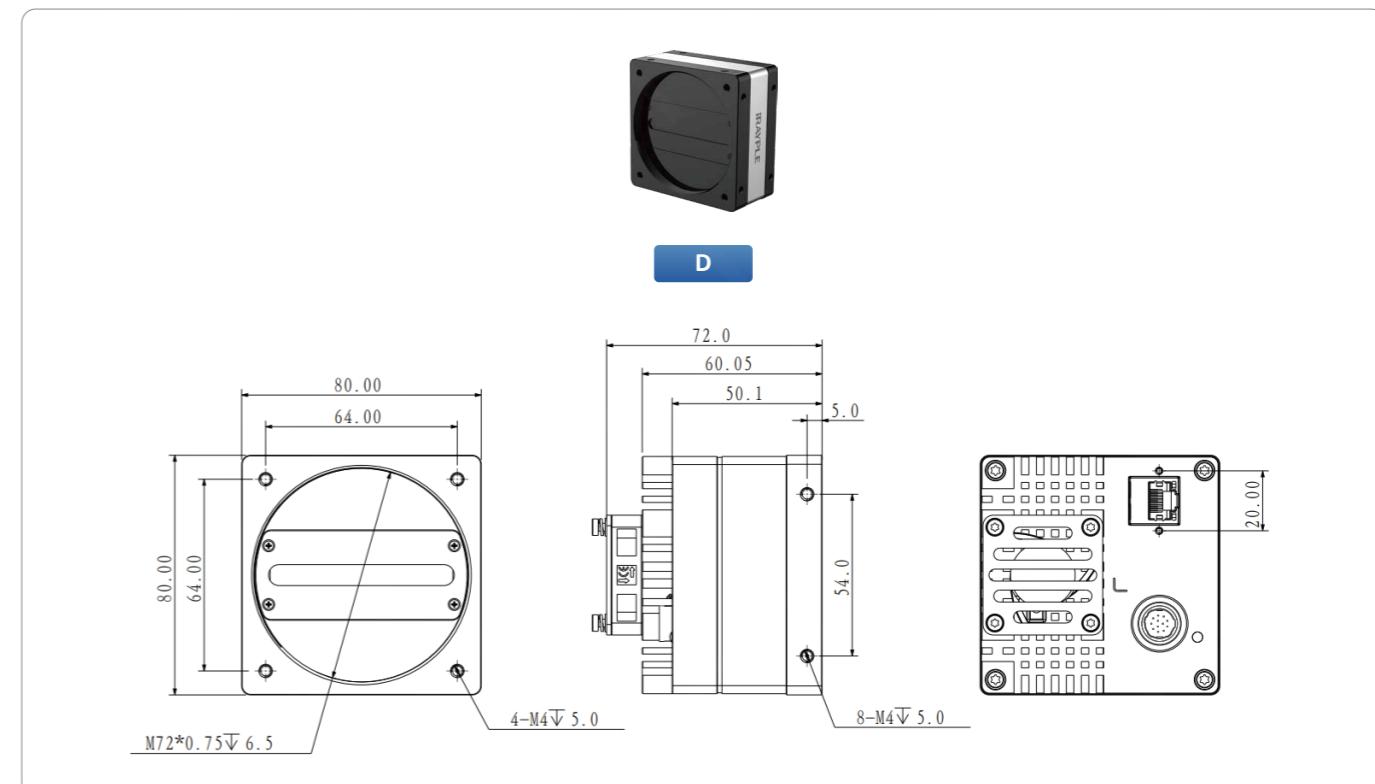
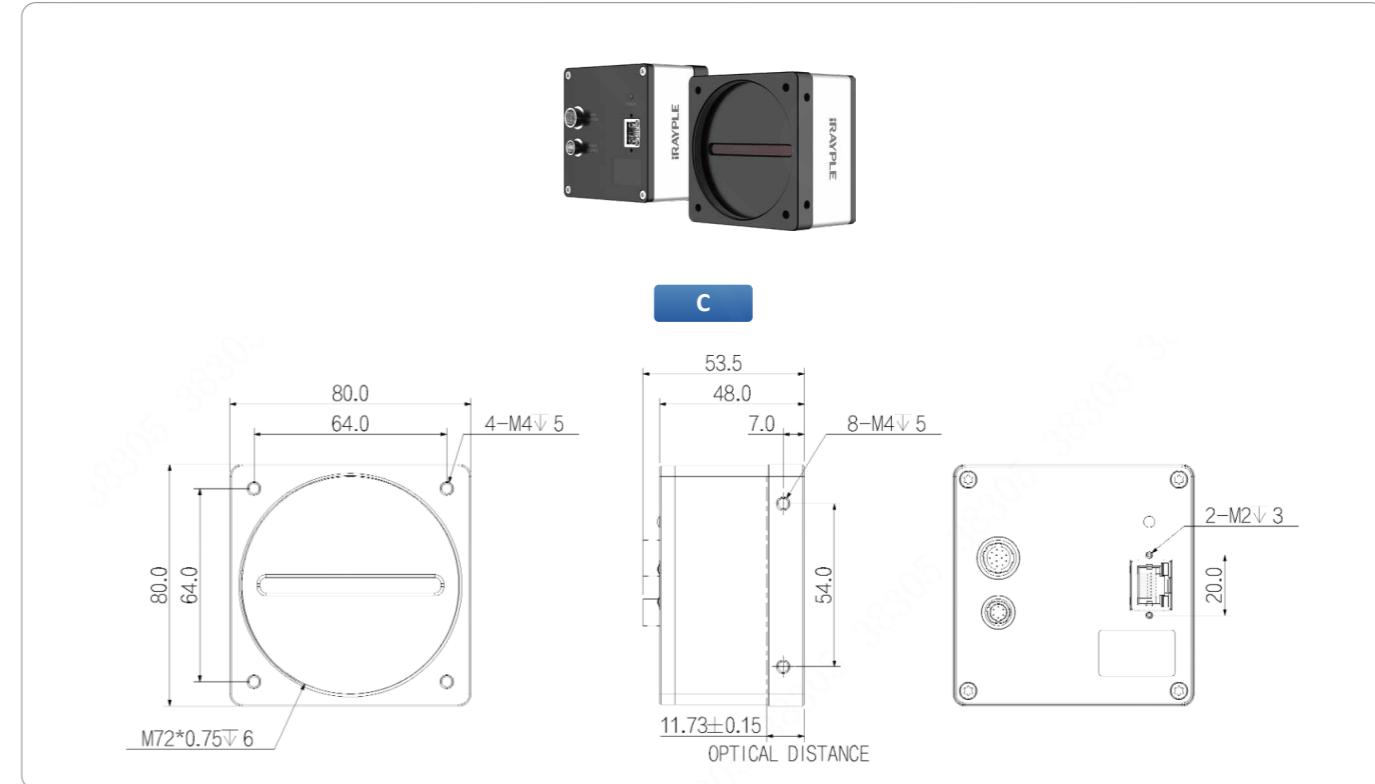
L5000 Series	
Model	L5162MK170E
Sensor	16K
Image Sensor	CMOS
Shutter	Global
Resolution	16384 × 1
Line Rate	50 kHz
Bit Depth	12
Mono/Color	Mono
Pixel Size	3.5 μm × 3.5 μm
S/N Ratio	44 db
WDR	64 db
Image Format	Mono8/10
Binning	Support
ROI	Support
X Flip	Support
Gain	1–32
Gamma	From 0 to 4, support LUT
Exposure Time	3 μs–100 ms
Trigger Mode	Software Trigger/Hardware Trigger/Free Run Mode
FPN	Support
Pixel Clock	51/67/75/85MHz
Interface	Camera Link
Lens Mount	M72
Power Consumption	6 W
Product Dimensions	80 mm × 80 mm × 39.5 mm (Not including rear case connector)
Appearance Dimension Diagram	H
Connector Pin-out	b



## 2D Drawing

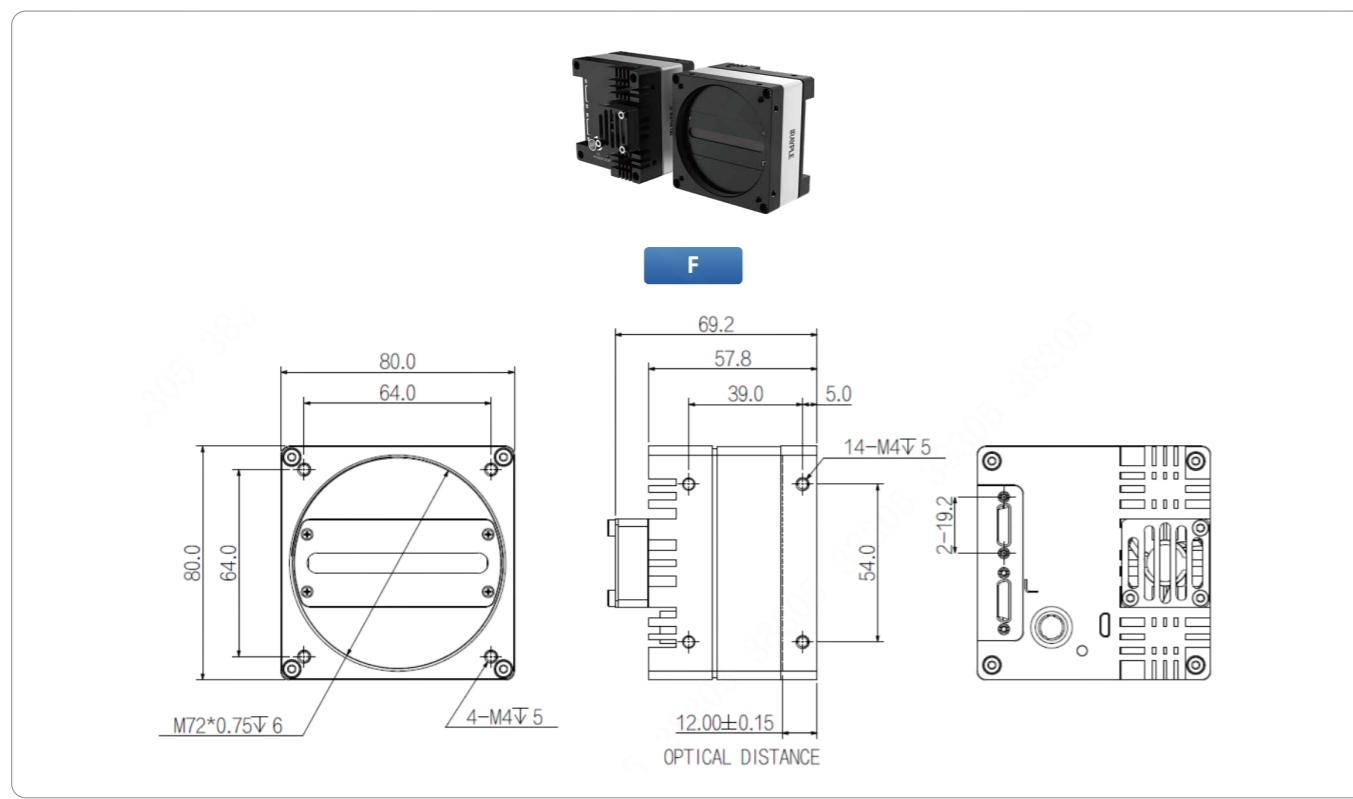
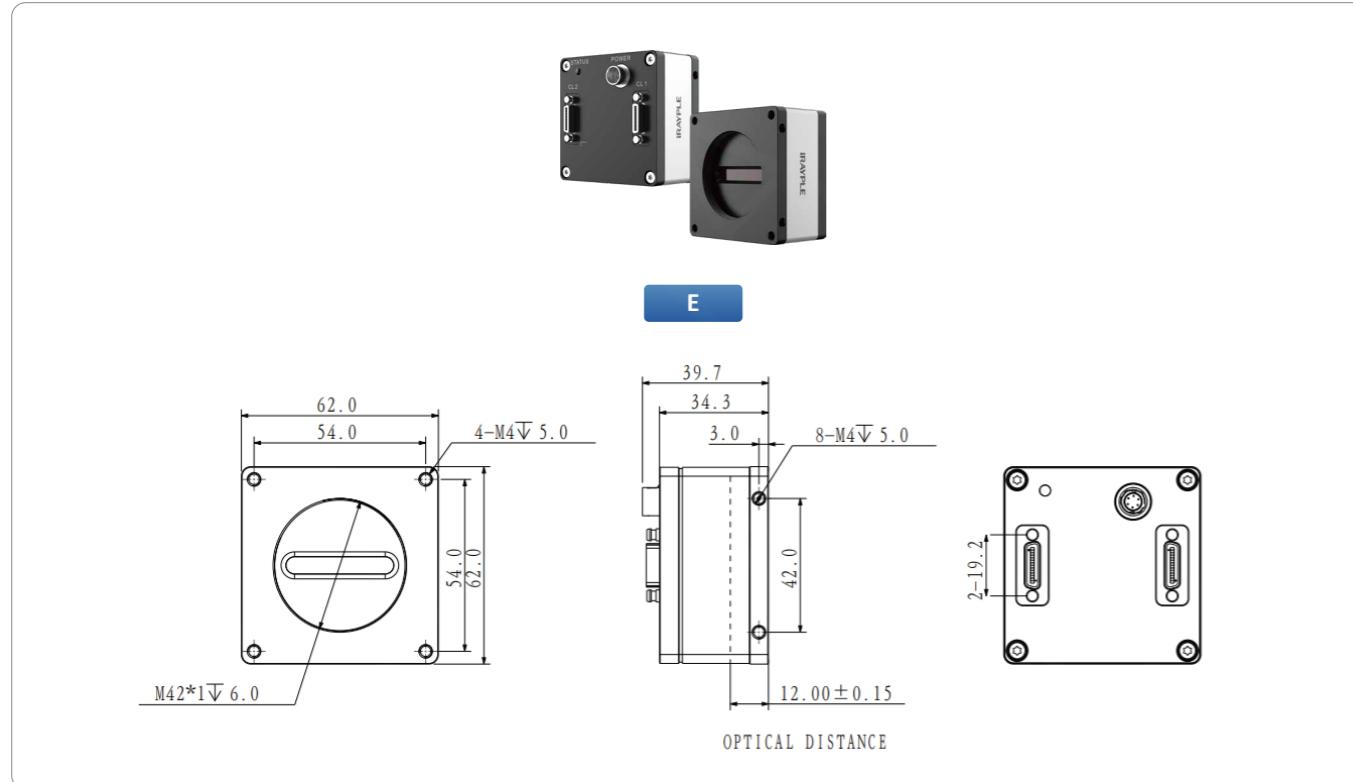


## 2D Drawing

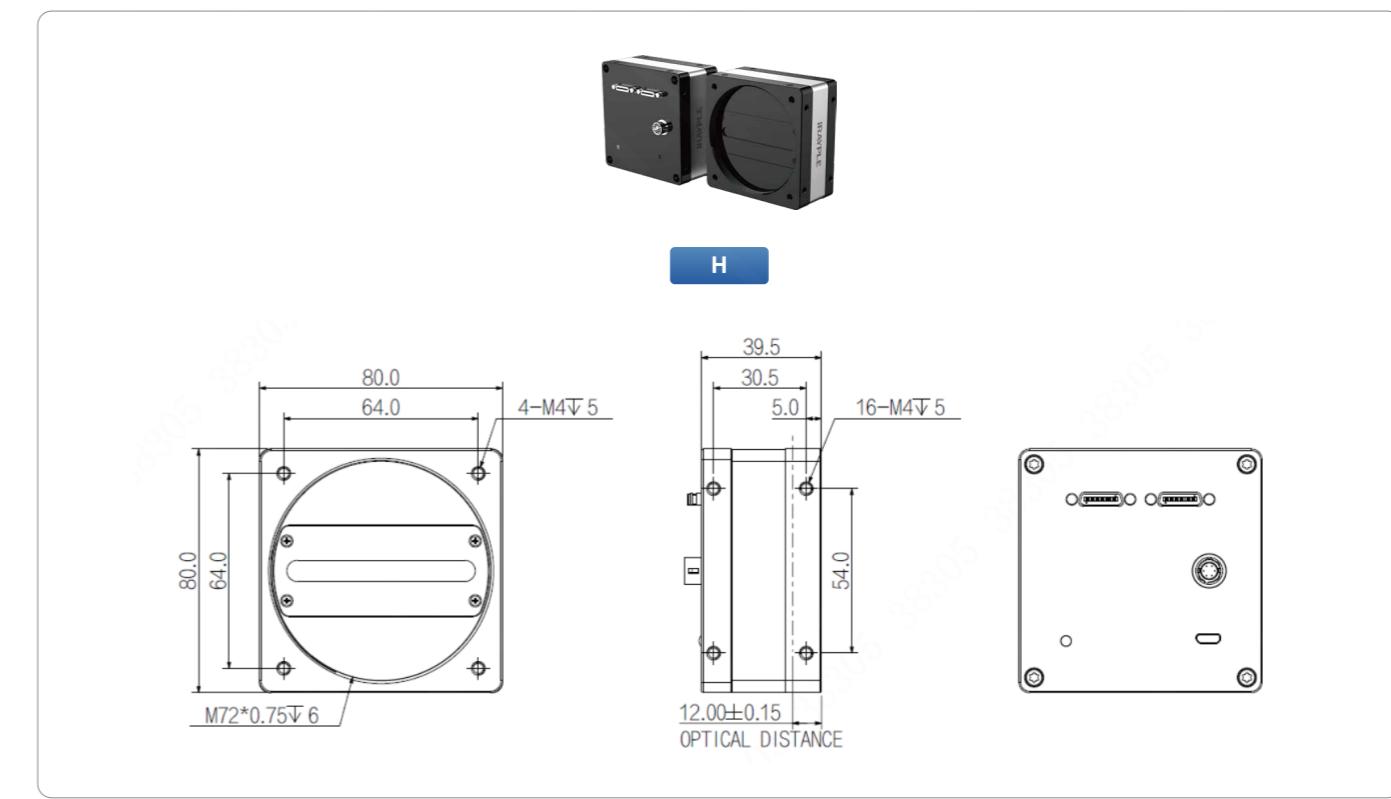
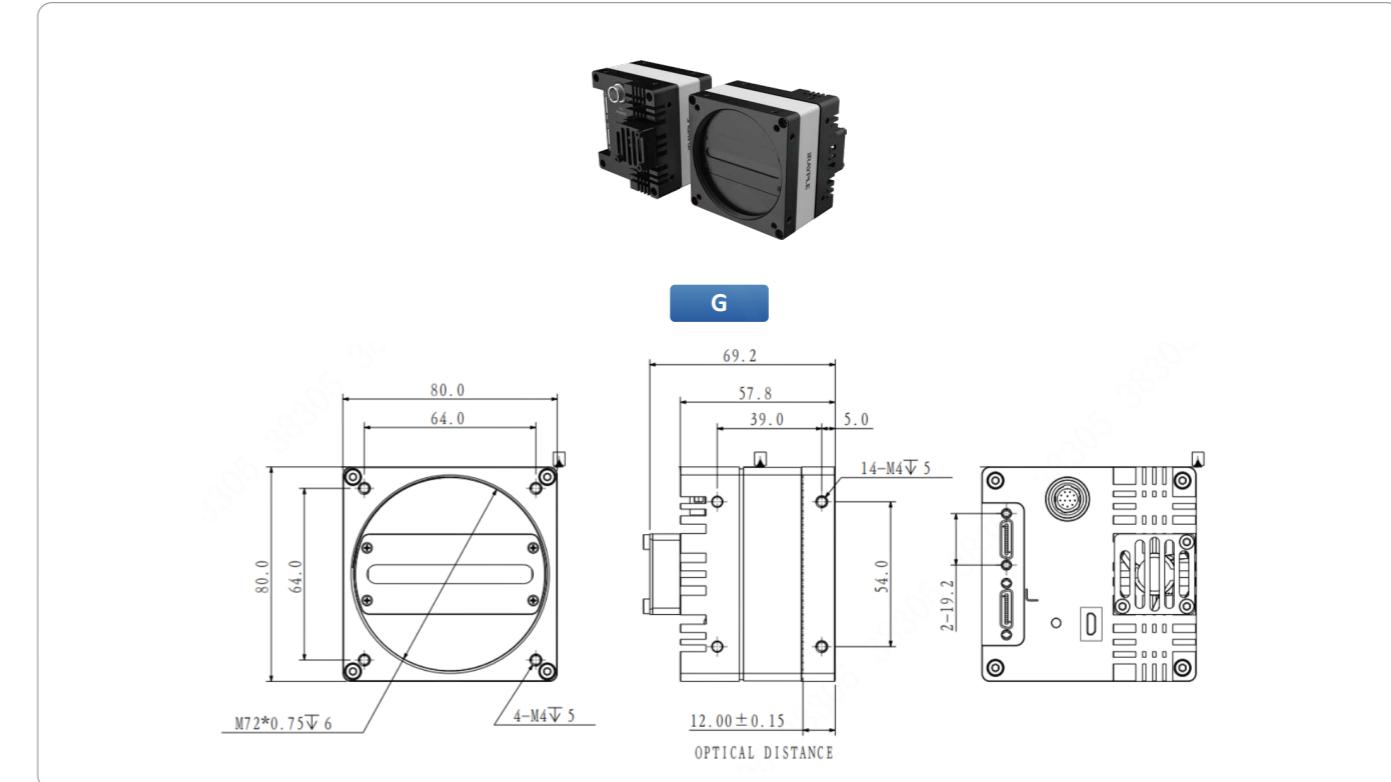




## 2D Drawing



## 2D Drawing



## Connector Pin-out

Pin	Description	Features
1	Power GND	Power GND
2	Camera Power	Power Supply
3	IN Line1+	Input Line1+
4	IN Line1-	Input Line1-
5	Signal GND	Signal ground
6	IN Line2+	Input Line2+
7	IN Line2-	Input Line2-
8	IN Line4	Bidirectional GPIO Line4
9	IN/OUT Line3+	Configurable input/output Line3+
10	IN/OUT Line3-	Configurable input/output Line3-
11	OPT_IN Line5	Opto-isolated input Line5
12	OPT GND	Opto-isolated ground point

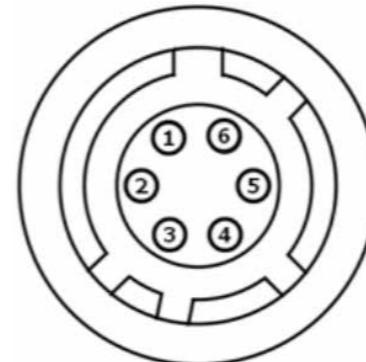
Pin	Description	Features
1	Power	+12V DC to 24V DC power supply
2		Not connected
3		
4		
5		
6	GND	Camera DC power ground

## Connector Pin-out

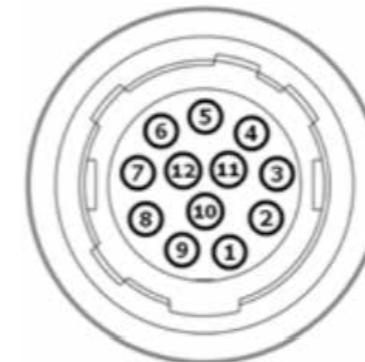
Pin	Description	Features
1	line1_in-	RS422 input-
2	line1_in+	RS422 input+/single-ended input
3	line3_inout-	RS422 input and output-
4	line3_inout+	RS422 input and output+/single-ended input and output
5	Signal ground	Signal GND
6	Line5_out-	RS422 output-
7	Line5_out+	RS422 output+/single-ended output
8	Line2_in-	RS422 input-
9	Line2_in+	RS422 input+/single-ended input
10	Line4_GPIO	Single-ended input/output
11	Line6_out-	RS422 output-
12	Line6_out+	RS422 output+/single-ended output

**a**


Port definitions of 12-pin signals on camera

**b**


Definitions of 6-pin power port on camera

**c**


Port definitions of 12-pin signals on camera

## Connector Pin-out

Pin	Description	direction	Features	
			Difference mode	Single-ended mode
1	Power GND	\	Power GND	
2	VIN	\	Power Supply	
3	LINE1+	Input/output	In-phase input/output	input/output
4	LINE1-	Input/output	Inverting input/output	Suspended (not connected)
5	Signal GND	\	Signal GND	
6	LINE2+	Input/output	In-phase input/output	input/output
7	LINE2-	Input/output	Inverting input/output	Suspended (not connected)
8	GPIO	Input/output	GPIO	
9	LINE3+	Input/output	In-phase input/output	input/output
10	LINE3-	Input/output	Inverting input/output	Suspended (not connected)
11	LINE4+	Input/output	In-phase input/output	input/output
12	LINE4-	Input/output	Inverting input/output	Suspended (not connected)



Port definitions of 12-pin signals on camera

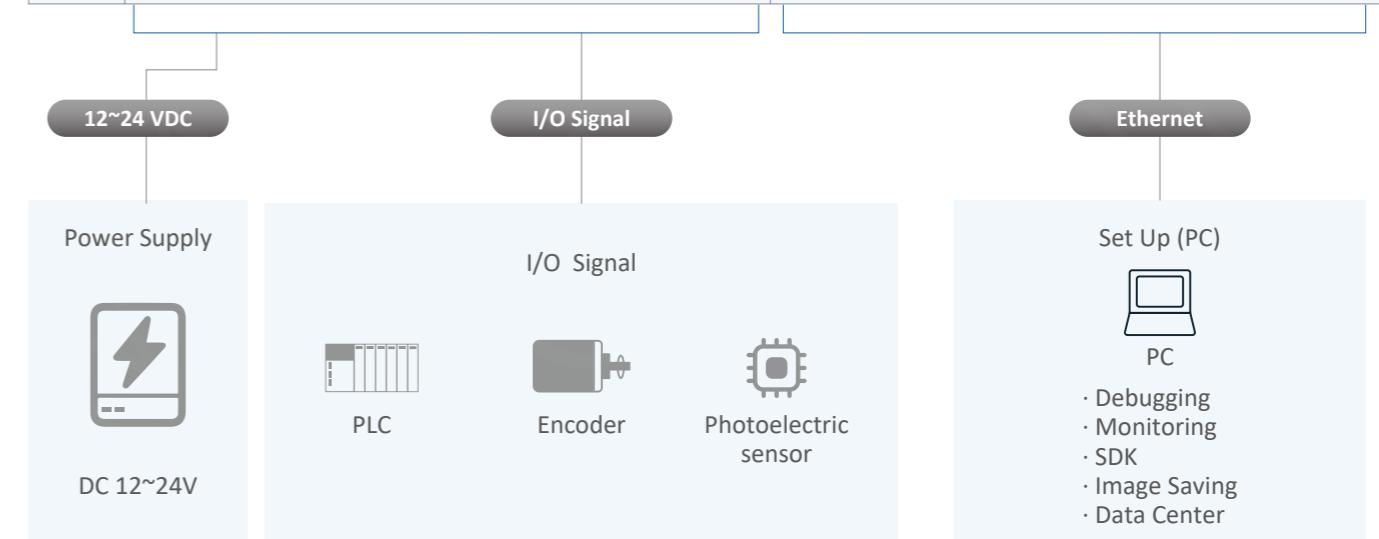
## System Components

### Compatible Models



### Cables

	Power & GPIO Cable		Ethernet Cable	
	Static	Flexible	Static	Flexible
5m	C01-IO-12PIN-DC-5M	C03-IO-12PIN-DC-FC-5M	C01-GE-RJ45-RJ45-5M	C03-GE-RJ45-RJ45-FC-5M
10m	C01-IO-12PIN-DC-10M	C02-IO-12PIN-DC-FC-10M	C01-GE-RJ45-RJ45-10M	C03-GE-RJ45-RJ45-FC-10M



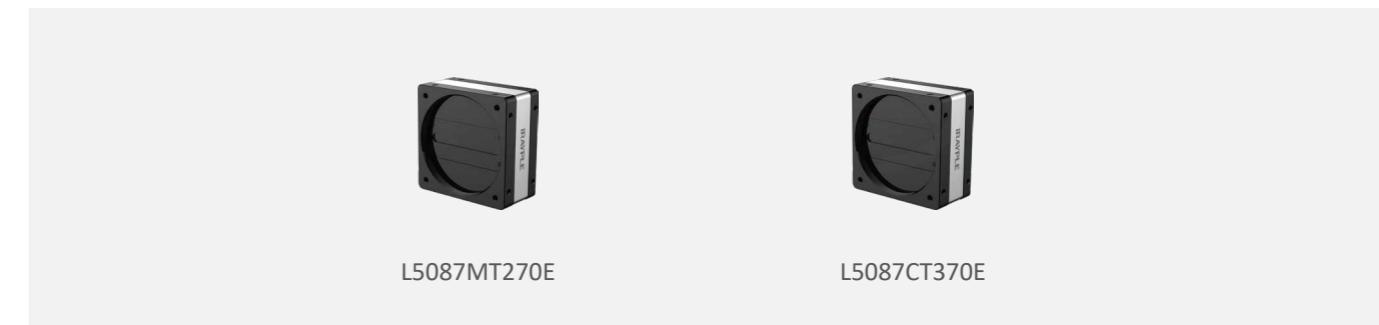
## System Components

### Compatible Models



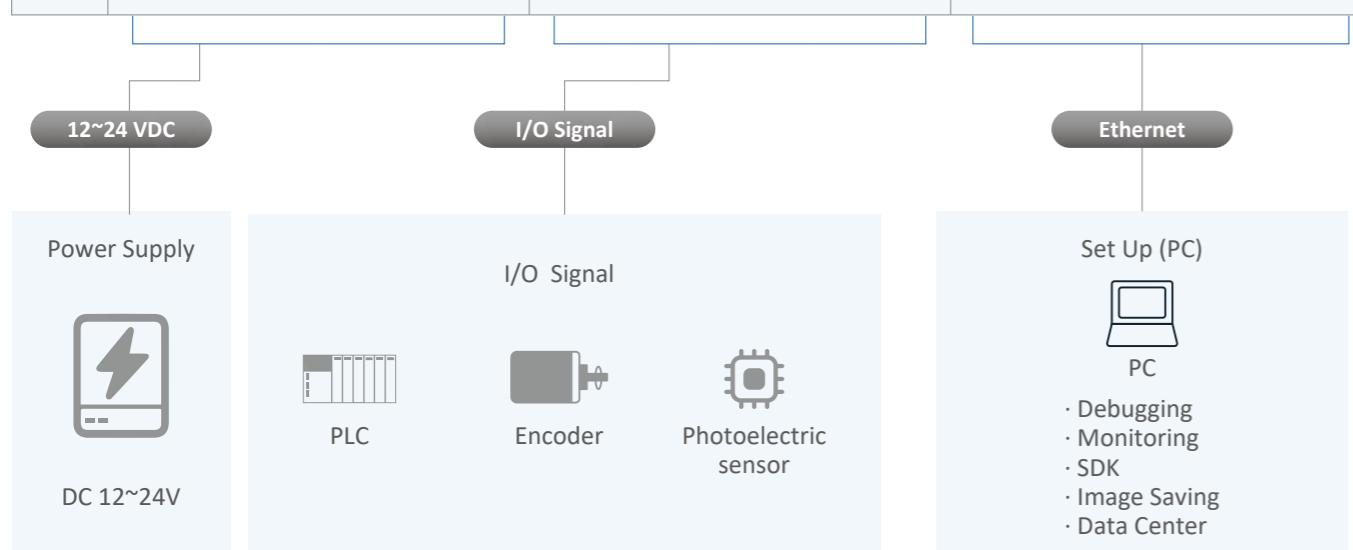
## System Components

### Compatible Models



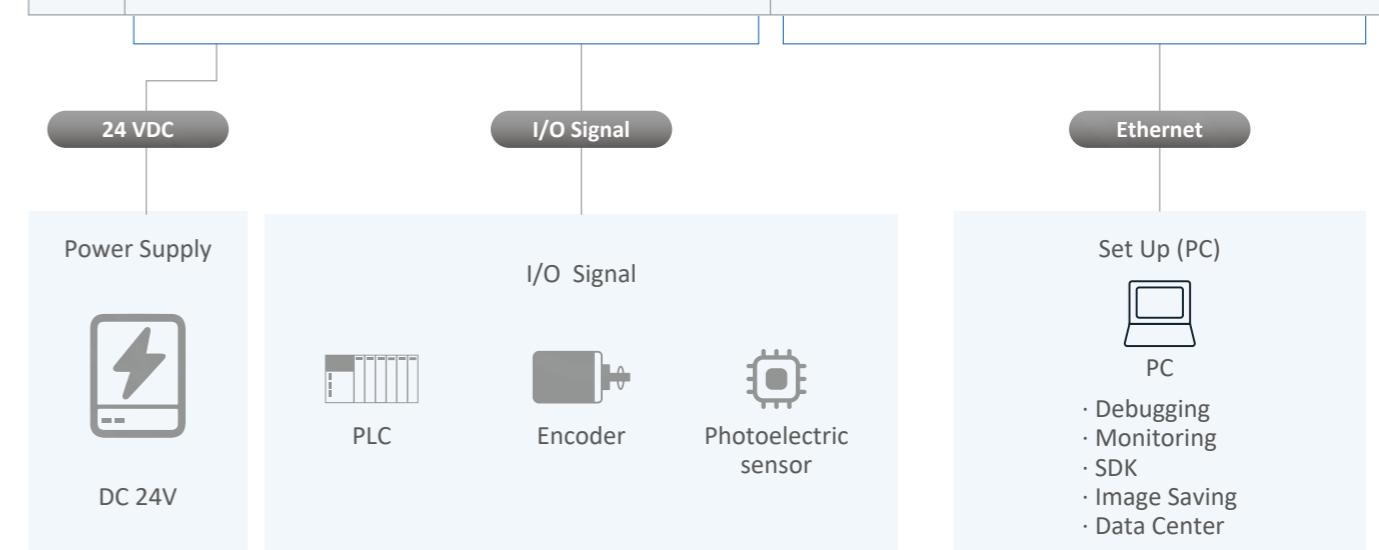
## Cables

	Power Cable		GPIO Cable		Ethernet Cable	
	Static	Flexible	Static	Flexible	Static	Flexible
5m	C02-IO-6PIN-DC-5M-LC	C02-IO-6PIN-DC-FC-5M	C01-IO-12PIN-DC-5M	C03-IO-12PIN-DC-FC-5M	C01-GE-RJ45-RJ45-5M	C03-GE-RJ45-RJ45-FC-5M
10m	C02-IO-6PIN-DC-10M-LC	C02-IO-6PIN-DC-FC-10M	C01-IO-12PIN-DC-10M	C02-IO-12PIN-DC-FC-10M	C01-GE-RJ45-RJ45-10M	C03-GE-RJ45-RJ45-FC-10M



## Cables

	Power & GPIO Cable		Ethernet Cable	
	Static	Flexible	Static	Flexible
5m	C01-IO-12PIN-DC-5M	C03-IO-12PIN-DC-FC-5M	C01-10GE-RJ45-RJ45-5M	C01-10GE-RJ45-RJ45-FC-5M
10m	C01-IO-12PIN-DC-10M	C02-IO-12PIN-DC-FC-10M	C01-10GE-RJ45-RJ45-10M	C01-10GE-RJ45-RJ45-FC-10M



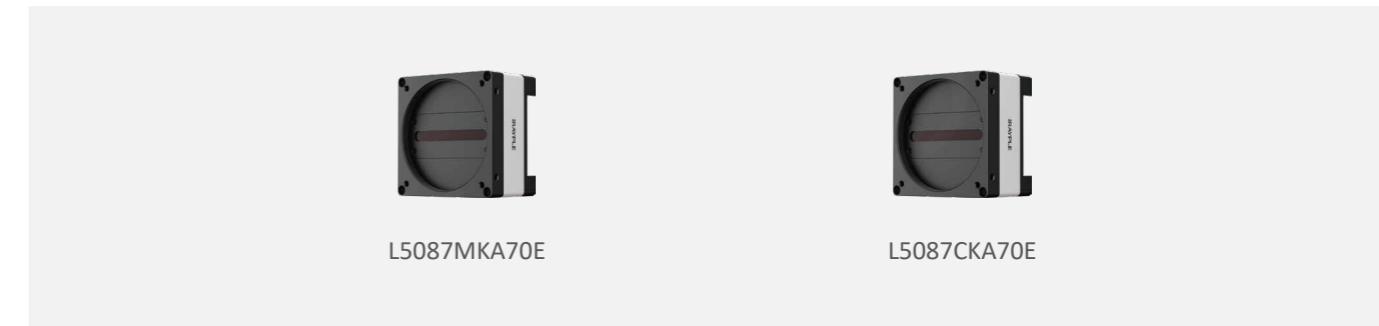
## System Components

### Compatible Models



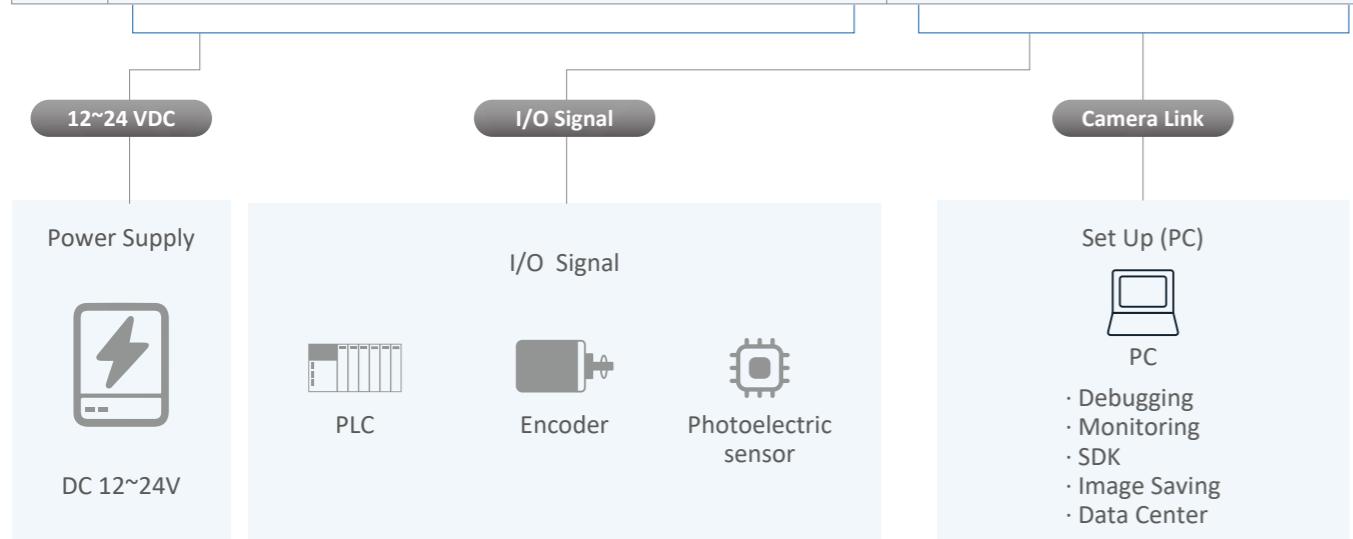
## System Components

### Compatible Models



## Cables

	Power Cable		GPIO Cable	
	Static	Flexible	Flexible	
5m	C02-IO-6PIN-DC-5M-LC	C02-IO-6PIN-DC-FC-5M	3m	C03-CL-SDR-SDR-PoCL-FC-3M
10m	C02-IO-6PIN-DC-10M-LC	C02-IO-6PIN-DC-FC-10M	7m	C03-CL-SDR-SDR-PoCL-FC-7M



## Cables

	Power Cable		GPIO Cable	
	Static	Flexible	Flexible	
5m	C01-IO-12PIN-DC-5M	C03-IO-12PIN-DC-FC-5M	3m	C03-CL-SDR-SDR-PoCL-FC-3M
10m	C01-IO-12PIN-DC-10M	C02-IO-12PIN-DC-FC-10M	7m	C03-CL-SDR-SDR-PoCL-FC-7M

