



## *EyeCheck 5xxx*

### Specification

# Contents

# 1. Feature

1. Intel ATOM CPU inside (E3845 @ 1.91 GHz, quad-core, 64-bit)
2. 4G-Byte DRAM, 64G-Byte storage, soldered on board
3. 64-bit OS: Windows 10 IoT Enterprise, Linux (Ubuntu)
4. Global Shutter CCD/CMOS, resolution from 0.3 MP to 12 MP
5. HDMI display port
6. 2 programmable constant current LED drivers
7. Free standard accessories: I/O module and connecting cables
8. Rock-solid system stability, operating temperature from -40°C to +80°C

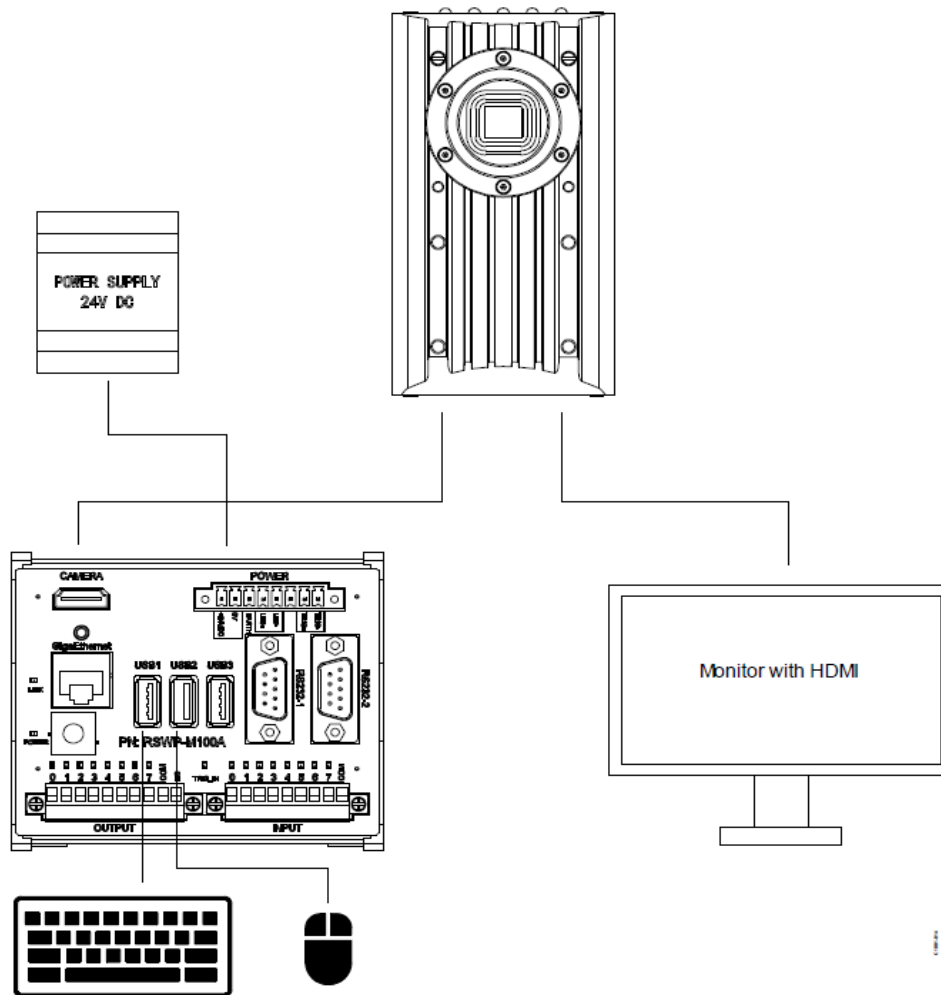


## 2. Application

### 2.1 Application

- Surface inspection, High-accuracy measuring
- OCR, Bar code, DMC, QR recognition
- Matching, Classification

### 2.2 Application Diagram



### 3. Specification

#### 3.1 Product Model – Camera

Model	Type	Resolution	Max. FPS	Shutter	Sensor Description
EC5000	Mono	640x480	120	Global	SHARP CCD RJ33B4AA0DT, 1/3", 7.4um
EC5000c	Color	640x480	120	Global	SHARP CCD RJ33B3AA0DT, 1/3", 7.4um
EC5010	Mono	640x480	200	Global	SHARP CCD RJ33B4AA0DT, 1/3", 7.4um
EC5010c	Color	640x480	200	Global	SHARP CCD RJ33B3AA0DT, 1/3", 7.4um
EC5200	Mono	1280x960	30	Global	SHARP CCD RJ33J4CA0DT, 1/3", 3.75um
EC5200c	Color	1280x960	30	Global	SHARP CCD RJ33J3CA0DT, 1/3", 3.75um
EC5300	Mono	1280x1024	105	Global	ONSEMI CMOS NOIP3SN1300A, 1/2", 4.8um
EC5300c	Color	1280x1024	105	Global	ONSEMI CMOS NOIP3SE1300A, 1/2", 4.8um
EC5400	Mono	1616x1232	50	Global	SHARP CCD RJ31N4AD0DT, 1/1.8", 4.4um
EC5400c	Color	1616x1232	50	Global	SHARP CCD RJ31N3AD0DT, 1/1.8", 4.4um
EC5410c	Color	1616x1232	15	Global	SONY CCD ICX274AQ, 1/1.8", 4.4um
EC5500	Mono	2048x1536	55.6	Global	SONY CMOS IMX265LLR, 1/1.8", 3.45um
EC500c	Color	2048x1536	55.6	Global	SONY CMOS IMX265LQR, 1/1.8", 3.45um
EC5600	Mono	2448x2048	15	Global	SHARP CCD RJ32S4AD0DT, 2/3", 3.45um
EC5600c	Color	2448x2048	15	Global	SHARP CCD RJ32S3AD0DT, 2/3", 3.45um
EC5610	Mono	2456x2048	35.7	Global	SONY CMOS IMX264LLR, 2/3", 3.45um
EC5610c	Color	2456x2048	35.7	Global	SONY CMOS IMX264LQR, 2/3", 3.45um
EC5700	Mono	3072x2048	30	Rolling	SONY CMOS IMX178LLJ, 1/1.8", 2.4um
EC5700c	Color	3072x2048	30	Rolling	SONY CMOS IMX178LQJ, 1/1.8", 2.4um
EC5900c	Color	4000x3000	20	Rolling	SONY CMOS IMX226CQJ, 1/1.7", 1.85um

### 3.2 Product Model – I/O Module

<b>Model</b>	<b>EC-M100A</b>
<b>Description</b>	EyeCheck 5xxx Series Industrial Smart Camera I/O Module

### 3.3 Product Model LED Illuminator

<b>Model</b>	<b>Color</b>	<b>Wave Length or Color Temperature</b>	<b>Beam Angle</b>	<b>Max. Driving Current</b>
EC-LW45	White	6500K	45°	300mA
EC-LW90	White	6500K	90°	300mA
EC-LR60	Red	624nm	60°	100mA
EC-LY60	Yellow	590nm	60°	100mA
EC-LG60	Green	525nm	60°	100mA
EC-LB60	Blue	470nm	60°	100mA
EC-LI60	IR	850nm	60°	100mA

### 3.4 Specifications

<b>CPU</b>	<b>CPU Model</b>	Intel ATOM CPU E3845
	<b>CPU Type</b>	Quad-core 1.91GHz, 64-bit x86
	<b>L2 Cache</b>	2M-byte
	<b>GPU</b>	Support DirectX11, OpenGL3.0, OpenCL1.2
	<b>Memory</b>	4G-byte DDR3L-1333 (solder on board)
	<b>Storage</b>	64G-byte eMMC5.0 Flash (solder on board)
<b>I/O Module</b>	<b>Ethernet</b>	One Gigabit Ethernet by Intel I210 controller
	<b>USB</b>	Three USB 2.0 ports One internal USB 2.0 (inside camera casing, dedicated for USB dongle)
	<b>Monitor Port</b>	One HDMI port, support resolution from VGA (640x480) to 1080P
	<b>Serial Port</b>	Two 9-pin RS232 ports with TX/RX signal only
	<b>Trigger Input</b>	One isolated trigger input (5V/12V/24VDC supported)
	<b>General Input</b>	Eight photo-isolated input ports (5V/12V/24VDC supported)
	<b>General Output</b>	Eight photo-isolated output ports (Max current 0.3A, Max voltage 40VDC)
<b>Special Functions</b>	<b>LED Driver</b>	Two constant current LED drivers, output current adjustable: Internal LED driver only supports EVT LED board, with max output 0.3A/24V External LED driver (in IO module) supports general LED illuminator, with max output 1.5A/24V
	<b>LED Indicator</b>	Five red/green indicators: Power, LAN and three user-defined LEDs
	<b>Delayed Triggering</b>	Delayed triggering is supported: Up to 32 delayed instances, each instance can be delayed up to 60 seconds, time precision: 1 microsecond
	<b>Watchdog</b>	Hardware Watchdog timer (1 to 256 second adjustable)
	<b>Encryption</b>	Unique chip ID encryption; dedicated encryption chip LKT4300 (soldered on board)
	<b>Temperature Monitoring</b>	Internal temperature sensor, real-time mainboard temperature monitoring
	<b>Remote Control</b>	WoL (Wake on LAN) supported, remote control via Ethernet
	<b>OS (64bit)</b>	Windows 10 IoT Enterprise, Linux (Ubuntu)
	<b>Power Consumption</b>	12W Max
	<b>Power Supply</b>	20 to 30 VDC (24 VDC recommended), 2A Max
	<b>Operation Condition</b>	-40°C to +80°C
	<b>Storage Condition</b>	-40°C to +90°C
	<b>Hardware Structure</b>	Aluminium alloy casing, fanless design
	<b>Dimensions</b>	110 x 61 x 47 mm
	<b>Weight</b>	380 g
	<b>Standards</b>	CE

Note:

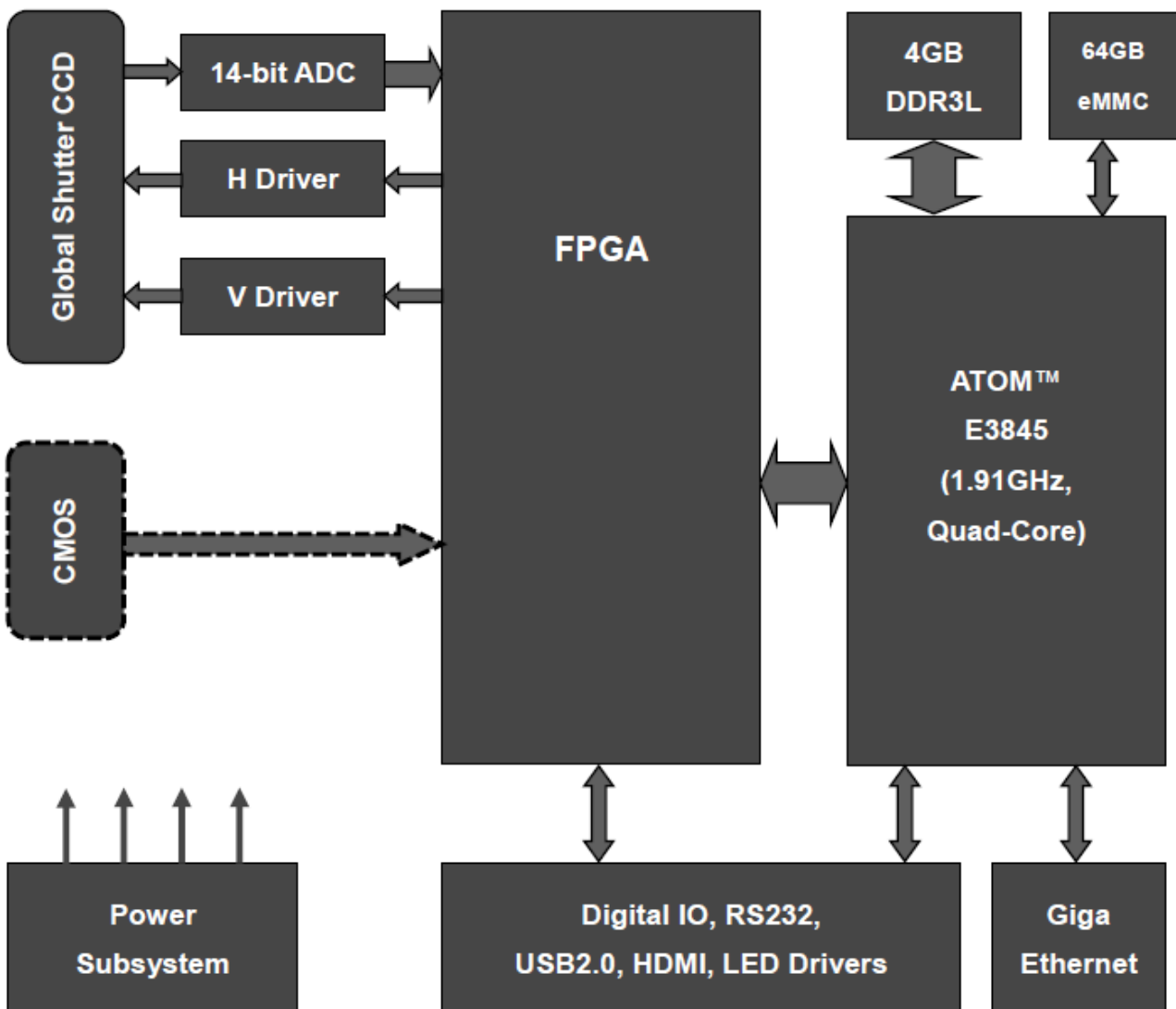
[1] The power consumption of the camera is 12W max. However, it takes more power consumption when using I/O module for external LED driving. So switching power with over 80W is recommended.

[2] After being placed in the environment of -40°C for 12 hours, the camera can be started and run for 24 hours. The camera can run for 48 hours in the environment of +80°C. The camera can run for 48 hours in the cyclic environment (5 hours for a cycle) of the temperature form -40°C to +80°C.

[3] The RTC runs for 4 weeks by the internal recharged battery, so time value must be set again when the camera power supply is cut off more than 4 weeks.

### 3.5 System Block Diagram

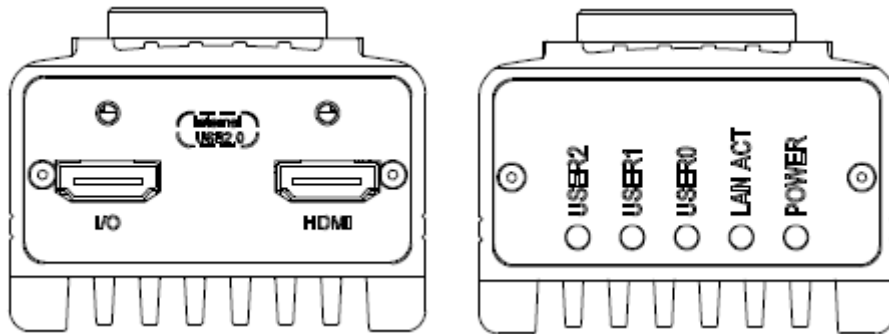
The block diagram of EyeCheck 5xxx series is as follows:





## 4. Interface – Camera

### 4.1 Ports on Panel



The EC 5xxx series includes camera and I/O module. They are connected with a HDMI cable (5 meters, with M3 setscrew). This customized cable is soft, with flexural endurance and oil resistivity for robot arm and cable chain.

The camera supports standard HDMI display port for displaying on monitor with HDMI port, supporting resolution from VGA (640x480) to 1080P.

Notice: the 3-meter HDMI cable with M3 setscrew may not match all monitors because of the connector size. Some monitors are ensured to match the cable.

The ports for I/O module and HDMI monitor look the same. However EVT provides fault-tolerant design which allows misplug without any damage to the camera.

### 4.2 Internal USB 2.0 Port

This USB 2.0 port is hidden inside the camera casing. User can use this port only when opening the rear panel.

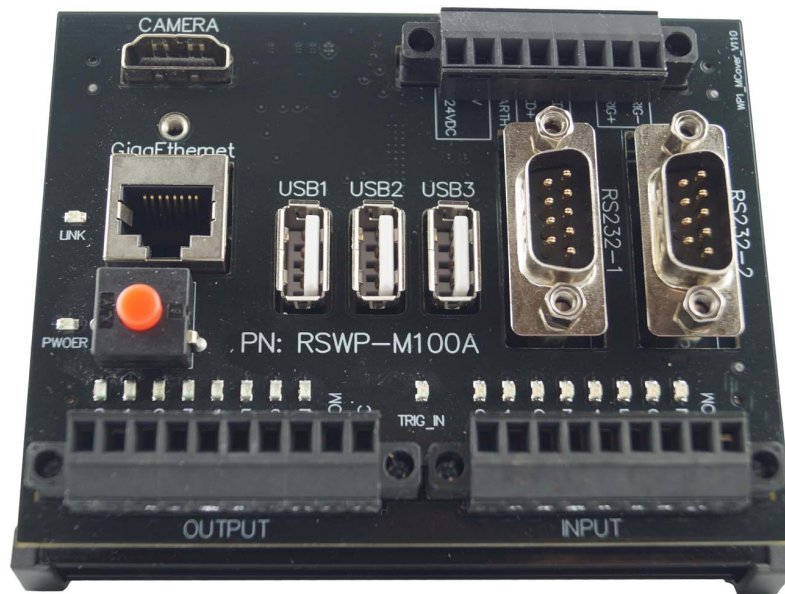
This internal USB port is designed for encryption USB dongle to avoid misplug.

### 4.3 LED Drivers

EVT provides constant current LED drivers on both, camera and I/O module with adjustable current (LED brightness) for machine vision applications, which reduces system costs and increases system stability.

The internal LED driver has max output 300mA/24V for EVT-designed illuminator only.

## 5. Interface – I/O Module



### 5.1 Camera Port

The port marked with "Camera" is for connection with the camera. With a customized cable, the camera can be connected with I/O module for ports extension. The cable is 5 meter long with M3 setscrews. Also available 8 meter cable on request.

### 5.2 Power Port

The 8-pin port marked "POWER" is the power port. This connector is compatible with 16-24 AWG wire. The 8-pin power port includes power input, trigger input, LED driver output and casing Earth.

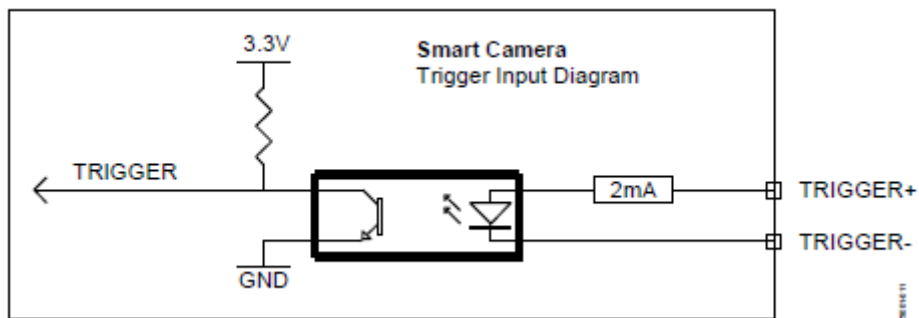
#### 5.2.1 Power Input

The power input ports marked with "0V" and "24VDC", support 20 to 30VDC (24VDC is recommended) input. This port supports reverse polarity protection, undervoltage protection, overvoltage protection and surge protection.

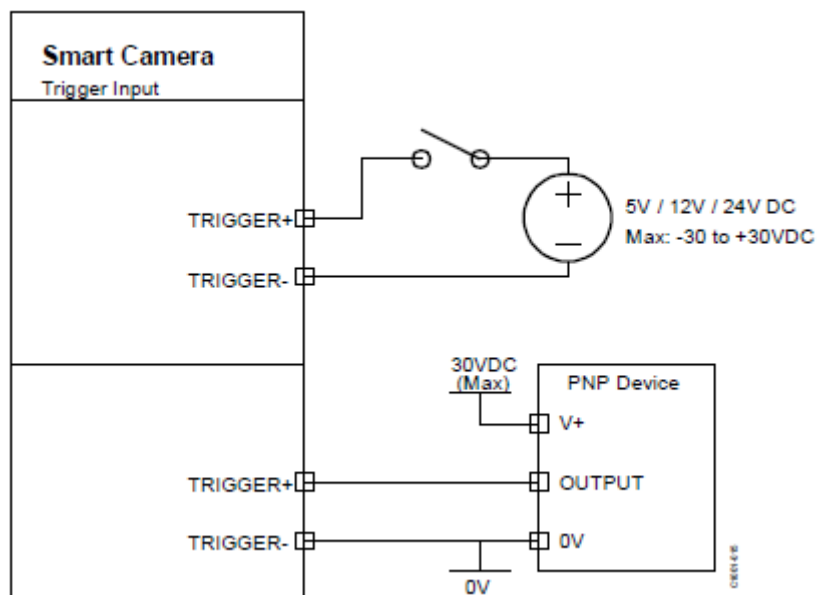
The power consumption of the camera is 12W max. However, it takes more power consumption when using I/O module for external LED driving. So power supply with over 24V/24 is recommended.

### 5.2.2 Trigger Input

The trigger input port marked with "TRIG+" and "TRIG-", is for external triggering signal like position sensor on production line.



Trigger input is a photo-isolated input, it can input 5V/12V/24VDC signal directly with no need for an external current-limiting resistor. -30V to +1V is recognized as low level, and +2.8 to +30V is recognized as high level, with input current below 2mA; voltage out of range from -30V to +30V may damage the circuit.



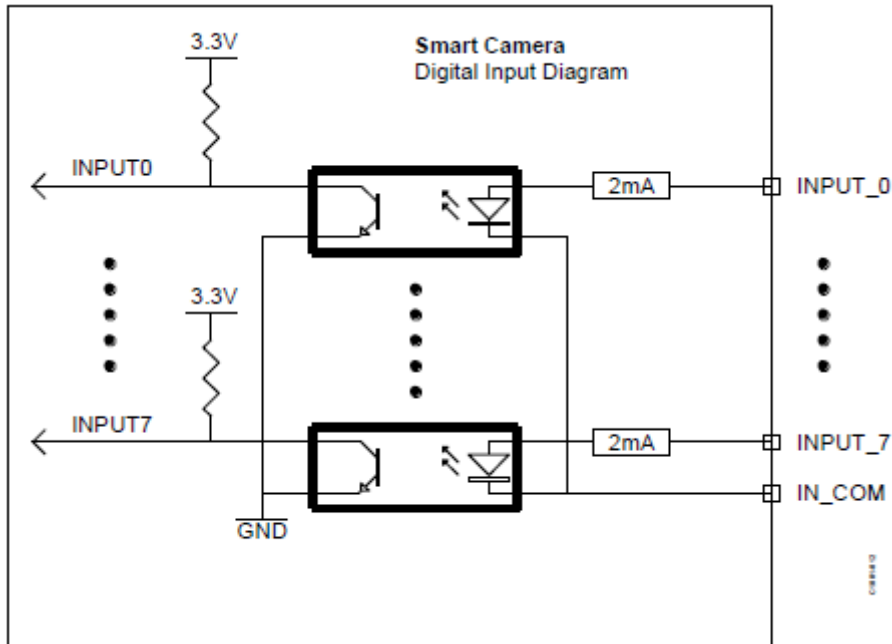
### 5.2.3 LED Driver output

The ports marked with "LED+" and "LED-" are for driving general passive LED illuminator. Please connect LED anode with "LED+" and connect cathode with "LED-".

The max. output voltage is 24V (so it supports LED illuminator under 24VDC), and the max. output current is 1.5A (1500mA). User can rapidly adjust the current (or brightness of LED) from 0mA to 1500mA by software.

### 5.3 General Input Port

The general input port is a 9-pin port marked with "INPUT". It is compatible with 16-24AWG wire.



There are 8 photo-isolated general input ports, they can input 5V/12V/24VDC signal directly with no need for an external current-limiting resistor. -30V to +1V is recognized as low level, and +2.8 to +30V is recognized as high level, with input current below 2mA; voltage out of range from -30V to +30V may damage the circuit.

It is recommended to use PNP output type sensors, switches or PLC.

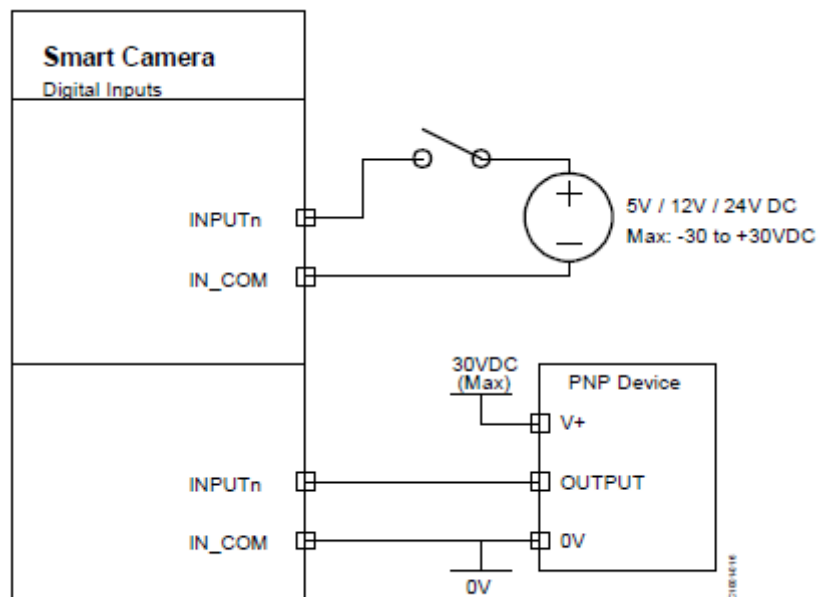
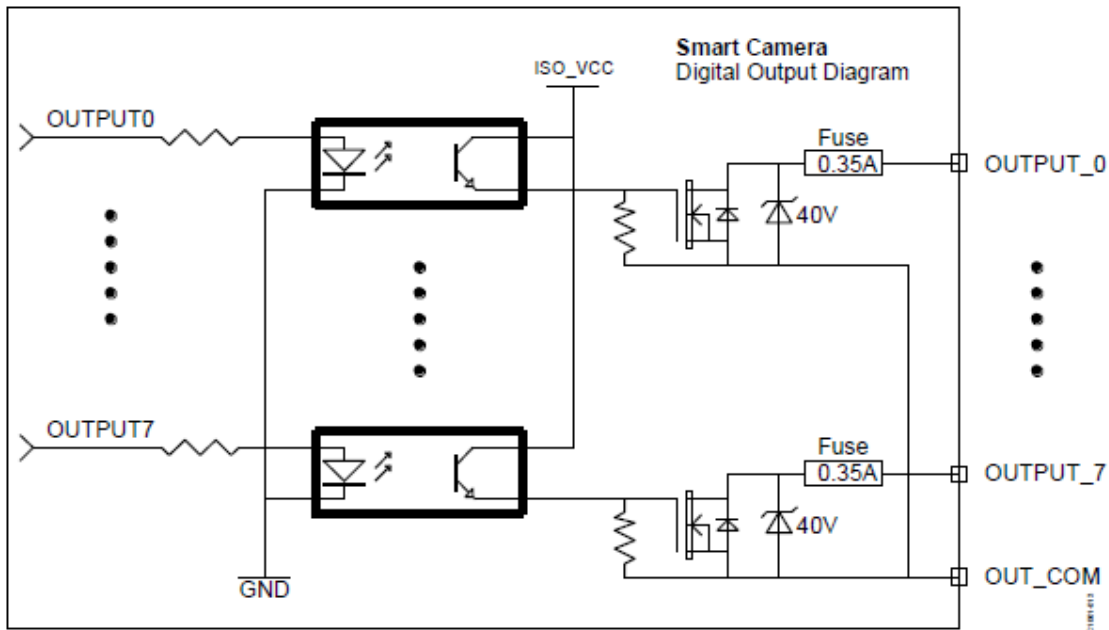


Figure 5-6 General Input Port Connection

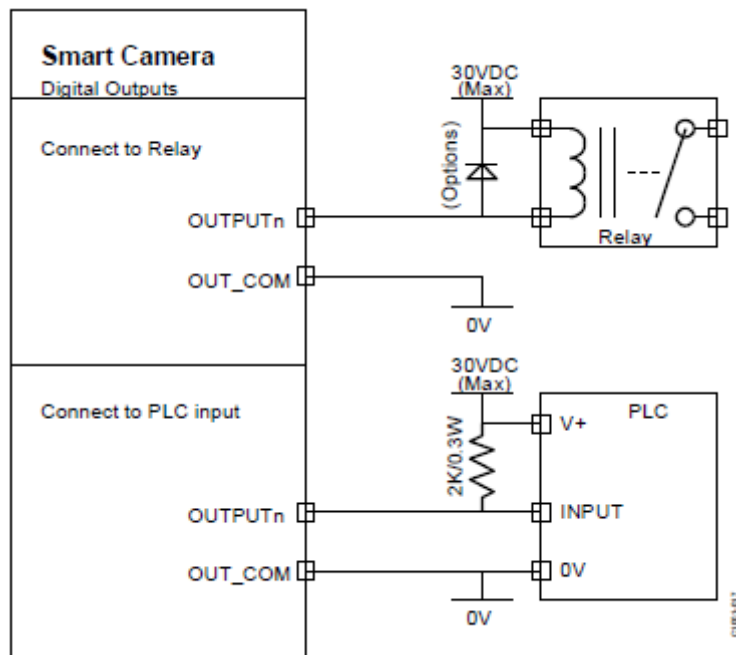
## 5.4 General Output Ports

The general output port is a 10-pin port marked with "OUTPUT". It is compatible with 16-24AWG wire.



There are 8 photo-isolated general output ports (NPN type) for driving resistive load or inductive load. The ports can sink 350mA/30V current. These ports need no fly-wheel diode when driving inductive load, because there are zener diodes onboard. The output saturation voltage  $V_{on}$  is less than 0.2V @ 350mA, and leakage current  $I_{off-leak}$  is less than 50uA.

As the concept of relay (definitions of OPEN and CLOSE), the MOSFET does not conduct when API sent command OPEN; when command CLOSE is sent, the MOSFET conducts and sinks up to 350mA current. The camera default setting is no output (OPEN) when power on.



This output delay time may be variable because of OS thread scheduling and user programming style, usually range from 0.1ms to 1ms.

## 5.5 RS232 Ports

There are two RS232 ports (standard DB9 connector) with mark "RS232-1" and "RS232-2". The two RS232 ports have only RX/TX signals for external devices like PLC, with supporting baud rate (bps): 230400, 153600, 115200, 57600, 19200, 9600, 4800, 2400, 600, 300.

## 5.6 Ethernet Port

There is a Gigabit Ethernet marked with "GigaEthernet". This port is used to connect with PC or PLC. Also, it can connect with other GigE cameras. PoE (Power over Ethernet) function is not supported.

If working in Gigabit mode, CAT-6 or CAT-6E cable is recommended for a better performance. The default IP address is 192.168.1.218.

## 5.7 USB2.0 Ports

There are three USB2.0 ports marked with "USB1", "USB2", "USB3". These USB ports are for connecting keyboard, mouse, USB flash drive and other general USB external devices. The output power of each port is 5V/0.5A.

## 5.8 Power Button

There is a self-lock push button marked with "POWER". The OS is highly customized to avoid accident from power failure, which means all cameras are able to work on production line with frequent power off without shutting down OS from desktop.

## 6. Functions Instructions

Below are some instructions of camera special functions for machine vision.

### 6.1 Shutter Time

#### 6.1.1 Minimum Shutter Time

Like other industrial cameras, the EyeCheck 5xxx has minimum shutter time limit. Because the features of different CCD/CMOS sensors are different, this minimum value for different models is different. If using illegal parameters (lower than the minimum value) to set shutter time by API, the camera will set the only according to the minimum value.

Model	Minimum Value (us)	Note
EC5000 & EC5000c EC5010 & EC5010c	8	
EC5300 & EC5300c	10	
EC5200 & EC5200c	17	
EC5400 & EC5400c	11	
EC5500 & EC5500c	14	
EC5610 & EC5610c	14	
EC5600 & EC5600c	20	
EC5700 & EC5700c	3	
EC5900	3	

The shutter time is adjustable by microseconds.

#### 6.1.2 Maximum Shutter Time

The maximum shutter time is 1 second, and it is adjustable by microseconds.

### 6.2 LED Drivers

Constant current LED drivers on both camera and I/O module are available with adjustable current for machine vision applications.

This function can greatly increase the life cycle of LED and reduce the system power consumption.

## 6.3 Trigger Input

### 6.3.1 Active Trigger Edge

The trigger input port accepts rising edge signal or falling edge signal. The default setting is rising edge signal.

### 6.3.2 Input Signal Glitch Filter

The input signal glitch filter function is disabled by default.

If this function is enabled, when the first trigger signal edge is received, system will double checks after the glitch filter delay time. Only when two results (before and after glitch filter delay time) are the same can the input trigger be accepted. For general digital sensors, this function is not recommended. However, for input trigger from mechanical switch, this function is very useful to avoid spurious triggering.

### 6.3.3 Trigger Delay

The time period between trigger signal input and image exposure starting is called triggering delay.

### 6.3.4 Delayed Triggering

For some machine vision applications, the triggering sensor is far from the camera, between which there are several components moving on production lines. In this case, delayed triggering function is necessary. EyeCheck 5xxx camera supports up to 32 delayed instances, each instance can be delayed up to 60 seconds, time precision: 1 microsecond.

## 6.4 General input

### 6.4.1 Active Triggering Edge

The trigger input port accepts rising edge signal or falling edge signal. The default active edge is rising edge. It is recommended to use PNP output type sensors, switches or PLC, because they can direct interface with the trigger port.

### 6.4.2 Input Signal Glitch Filter

The input signal glitch filter function is disabled by default. If this function is enabled, when the first trigger signal edge is received, system will double checks after the glitch filter delay time. Only when two results (before and after glitch filter delay time) are the same can the input signal be accepted. For general digital sensors, this function is not recommended. However, for input trigger from mechanical switch, this function is very useful to avoid malfunction. The glitch filter delay time should be set according to the field tests.

### 6.4.3 Input Delay

The time period between general input and user's program receiving message is called input delay. This input delay time may be variable because of OS thread scheduling and user programming style, usually range from 0.1ms to 1ms.



## 6.5 General Output

As the concept of relay (definitions of OPEN and CLOSE), the MOSFET does not conduct when API sent command OPEN; when command CLOSE is sent, the MOSFET conducts and sinks up to 350mA current. The camera default setting is no output (OPEN) when power on. This output delay time may be variable because of OS thread scheduling and user programming style, usually range from 0.1ms to 1ms.

## 6.6 Camera Recovery

The EyeCheck 5xxx supports recovery function, including BIOS and OS recovery. User can easily recover the camera to factory default status.

# 7. Dimensions

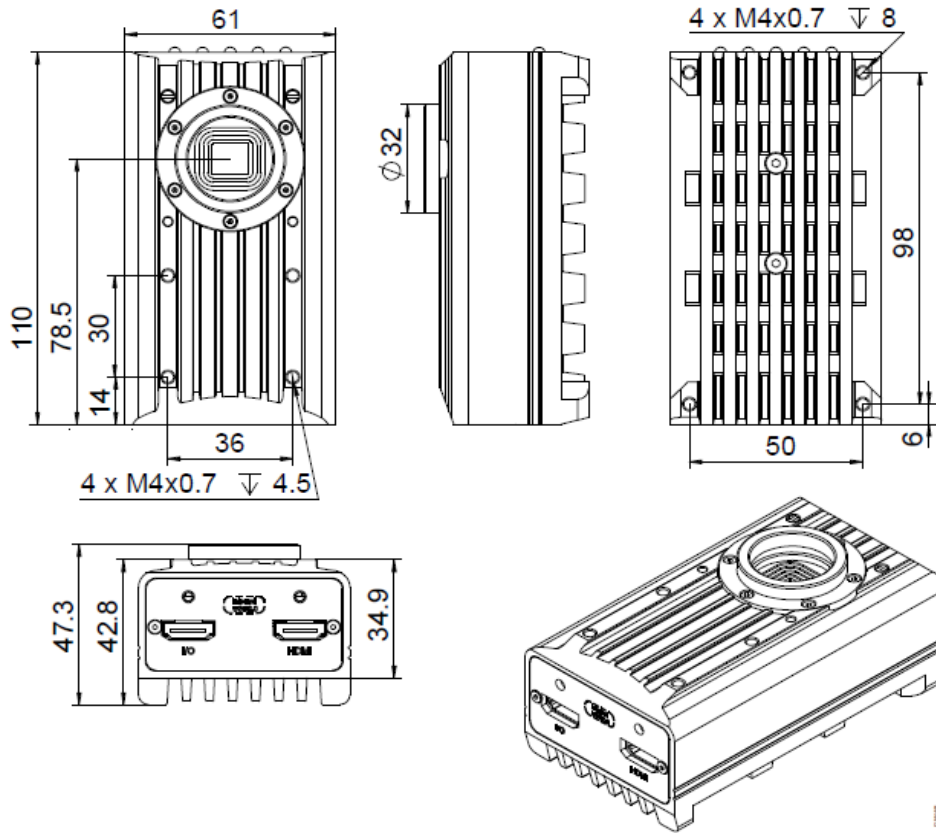


Figure 7-1 Outline Dimensions of Camera

**Note:**

- [1] Unit: mm.
- [2] Materials: hard aluminum alloy.
- [3] Color: silver gray.

