Q.400SD-R02

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Inhaltsverzeichnis

1 FEATURES

1. Intel® ATOM™ SoC E3950 2.00 GHz, Quad Core, soldered onboard Compared to E3845 (used in Q.400SD-R02): 50% CPU performance up with same power consumption 3.5 times DDR bandwidth boost 4.5 times GPU performance up for deep learning algorithm acceleration Support Intel® OpenVINO™ AI toolkit

2. 4GB dual-channel LPDDR4-2400, soldered onboard

3. 64GB eMMC storage for OS, soldered onboard

4. 64-bit OS: Windows 10 IoT Enterprise

5. HDMI and VGA display ports

6. 4x GigE Camera ports with PoE+ support

7. 1x 2.4G Wi-Fi port (optional)

8. 2x hardware PROFINET IO-Device ports (optional)

9. 4x independent constant current LED drivers

10. 8x digital inputs, 8 digital outputs

11. DIN-rail mounting, fanless

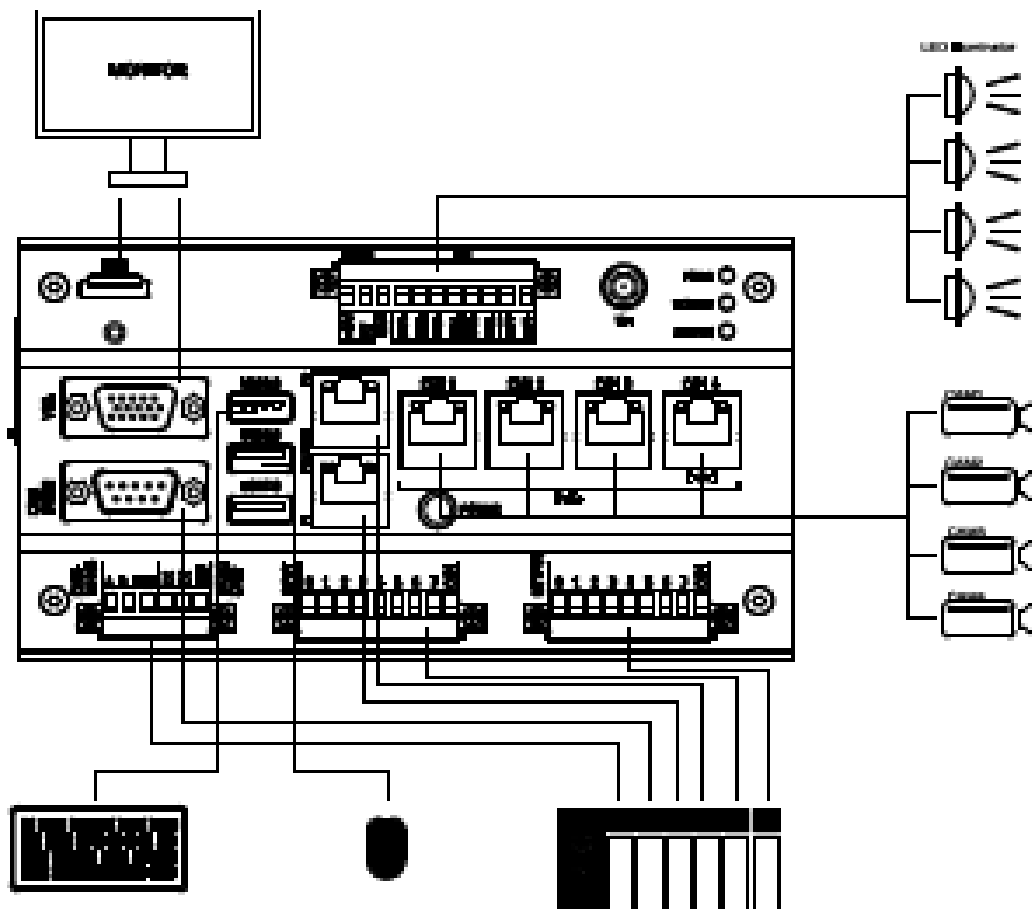12. Wide operation temperature -40°C to +80°C

13. 3-year warranty

2 APPLICATIONS

2.1 Applications

- Industrial Machine Vision
- Intelligent Transport System (ITS)

2.2 Application Diagram

3 SPECIFICATIONS

3.1 Performance

Table 3-1 Performance

Model	QPC-SD-R02
CPU	
CPU Model	Intel® ATOM™ SoC E3950, soldered on board
CPU Type	2.0GHz, quad cores, 64-bit
L2 Cache	2M-byte
GPU	Generation 9 graphics, support Intel® OpenVINO™ AI toolkit
RAM	4GB LPDDR4-2400, dual-channel, soldered onboard
Storage	64GB eMMC5.1 Flash for OS, soldered on board 1x M.2 SSD 2280 SATA slot 1x Micro SD card slot
I/O Ports	
Camera Ports	4x Gigabit Ethernet (Intel® I210 controller), support IEEE 802.3at (25.5W) PoE+
USB	2x USB3.0, 1x USB2.0 1x internal USB 2.0 port (inside of casing, dedicated for encryption dongle)
Display	1x HDMI, 1x VGA
Serial Ports	2x RS232, 1x RS485 (isolated)
Digital I/O	8x digital input ports, isolated 8x digital output ports, isolated Support 5V/12V/24V
Others	1x 2.4G (IEEE 802.11b/g/n) Wi-Fi port (optional)
Specialized Functions	
LED Drivers	4x independent Constant current LED drivers Current adjustable from 10mA to 1500mA in real time using software
Watchdog	Hardware watchdog (1 to 256 seconds adjustable by software)
Parameter Memory	32K-byte EEPROM, formatting disk has no effect on data stored in it
Encryption	There are 2 inalterable unique IDs for user's encryption: eMMC serial number, FLASH Unique chip ID
Temperature Monitoring	Embedded temperature sensor for internal temperature monitoring
LED Indicators	3x red/green dual color LEDs: Power, 2 user programmable LEDs
Remote Update	Remote update/reboot via Ethernet
OS (64 bit)	Windows 10 IoT Enterprise, Ubuntu 18.04.4
Power Supply	20 to 30VDC, 24VDC recommended
Consumption	15W max excluding the PoE cameras and LED boards
Operation Condition	Wide temperature -40°C to +80°C
Storage Condition	-50°C to +100°C
MTBF	350,000 hours
Construction	DIN-rail mounting, rugged full metal casing, fanless
Dimensions and weight	90 x 165 x 50 mm, 1 kg
Certification	CE

1. Notes:

aaaa	prefix	
	RSBV	Q.VITEC Q.400SD-R02 Vision Controller
b	generation	
	3	the 3nd generation
cc	Type number	
	00	standard model
d	industrial Ethernet port	
	N no industrial Ethernet port (default)	
	P	2 PROFINET IO-Device ports
e	Wi-Fi port	
	N	no Wi-Fi port (default)
	W	2.4G Wi-Fi (IEEE 802.11b/g/n) port (include an antenna)
f	special function	
	N	No special function (default)
gg	Pre-installed M.2 SSD capacity	
	M0	No M.2 SSD (default)
	Mx	xTB M.2 SSD, MQ for 0.25TB, MH for 0.5TB, M1 for 1TB, M2 for 2TB

2. The E3950 integrates a GPU, which can cooperate with Intel's free AI development tool OpenVI-NO to implement various AI algorithms, such as various Deep Learning algorithms. The computing power of this integrated GPU is about 1.5 TOPS.

3. The internal M.2 slot only supports SSDs of the following specifications: 2280 size, SATA3 interface, any capacity.

4. The test conditions are as follows: The device is connected to two PoE GigE cameras and connected to two 1A/24V LED flashes. It is placed in the -40 °C environment for 12 hours, then power on, can start normally; the equipment is placed in +80 °C environment, normal operation for 24 hours.

3.2 Software Resources

Q.400SD-R02 Vision Controller is based on x86 platform. It supports below OS and software.

1.   Supported OS (64-bit)
        Windows 10 IoT Enterprise, Linux (Ubuntu 18.04.4)
        The pre-installed Windows 10 IoT Enterprise is not activated and legal license service can be provided if needed. The genuine Microsoft authorization label is attached to the package.
        Notes:
·   Both Windows and Linux OS are highly customized by Q.VITEC to avoid any crash from pow er   failure, which means Q.400SD-R02 series vision controller can be powered off directly and no need to shut down from OS.
·   Only customized OS images from Q.VITEC can be used for camera OS recovery. Any other ver sion of OS may cause system crash.

2.   Recommended IDE
        Microsoft Visual Studio

3.   Supported General Software
        As an x86-based platform, Q.400SD-R02 supports all resources in Windows or Linux, for example:
        HALCON, VisionPro, AdaptiveVision, LabVIEW, OpenCV, SimpleCV, Matlab
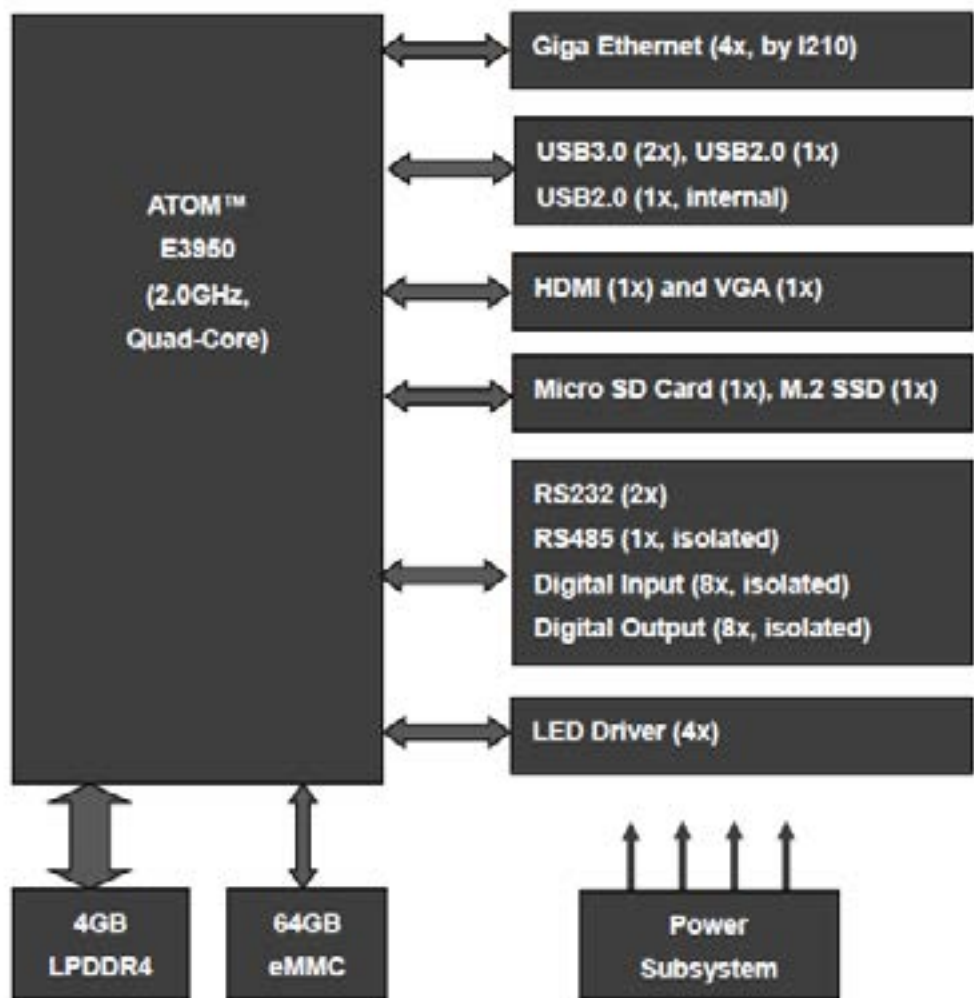
3.3 SDK Supporting

A complete SDK is available for Q.400SD-R02 series vision controller. For more information, please contact Q.VITEC support.
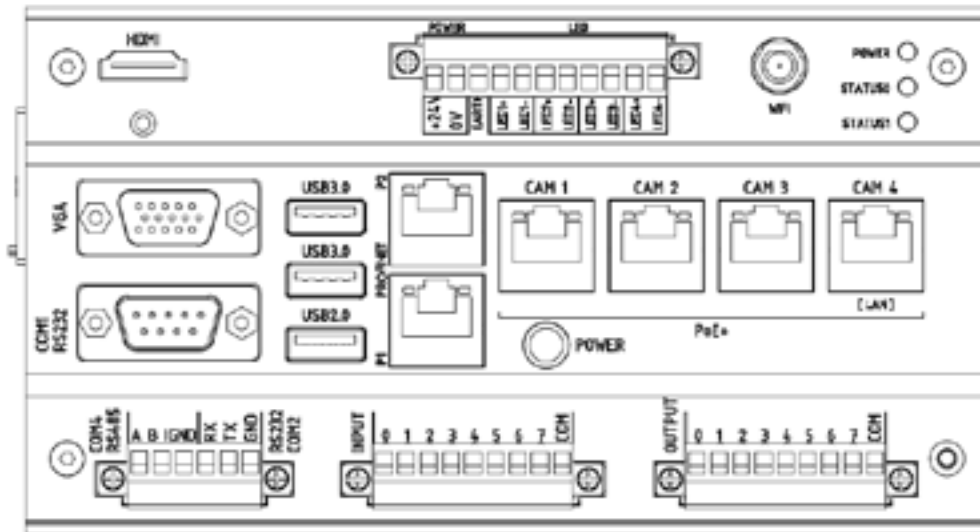SDK includes drivers, demos, detailed API reference guide and instructions for development environment setup etc.

3.4 System Block Diagram

The block diagram of Q.400SD-R02 Vision Controller is as below:

4 INTERFACES

4.1 Power and LED Port

The 11-pin connector with mark „POWER / LED" is for power input and LED driver outputs.
This connector is compatible with 16-24AWG wire.

4.1.1 Power input port

The power input port with mark „0V" and „+24V", supports 20 to 30VDC (24VDC is recommended) input. This port supports reverse polarity protection, under-voltage protection, overvoltage protection and surge protection.
The power consumption of the controller itself is 15W Max. However, it takes more power consumption when loading serval PoE GigE cameras and LED Illuminators. So the controller must be supplied with sufficient 24VDC power.
According to the following formula to estimate the output power of switching power supply:
Total Power (max) = 15W + 25W * Number of PoE Cameras + 35W * Number of LED Drivers
The switching power supply from Meanwell (www.meanwell.com) is recommended, for example, the DIN rail switching power NDR-240-24 (240W/24V/10A).

4.1.2 LED driver outputs

There are 4 independent constant current LED drivers with mark „LEDn+" and „LEDn-". They are for driving general passive LED Illuminators. Please connect LED anode with „LEDn+" and connect cathode with „LEDn-". 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 10mA to 1,500mA (with error +-10mA) by software.
Q.VITEC provides a special LED synchronization function which means the LED is only on during the exposure time of CCD/CMOS image sensor. This function can greatly extend the LED life and reduce the system power consumption.

4.2 GigE Camera Ports

There are 4 GigE camera RJ45 ports with mark „CAMn".
The Q.400SD-R02 vision controller can connect max 4 PoE GigE cameras. Each port is equipped with an Intel® I210 controller to achieve excellent data throughput and compatibility.
Each port can support IEEE 802.3at (25.5W) PoE+ which be able to supply all kinds of GigE cameras. The port with mark "LAN" is recommended to connect to the host if needed. The default settings are DHCP for each port, and user can reconfigure to specified IP address.

4.3 Wi-Fi Port

There is a Wi-Fi port with mark „WiFi". This port support 2.4G (IEEE 802.11b/g/n) Wi-Fi, and an antenna is provided at the factory. The Wi-Fi function is not a standard item and needs to be purchased by the user.

4.5 Digital Input Ports

4.5.1 Electrical Specifications

The 9-pin connector with mark „INPUT" is for 8 channel digital inputs. It is compatible with 16-24AWG wire. There are 8 photo-isolated general input ports which can accepts 5V/12V/24VDC signal directly without connecting a current-limiting resistor. According to different connecting, the outputs support PNP or NPN type input.
0V to +1V is recognized as low level, and +4V to +30V is recognized as high level, with input current below 2mA; voltage out of range from -30V to +30V may damage the circuit.
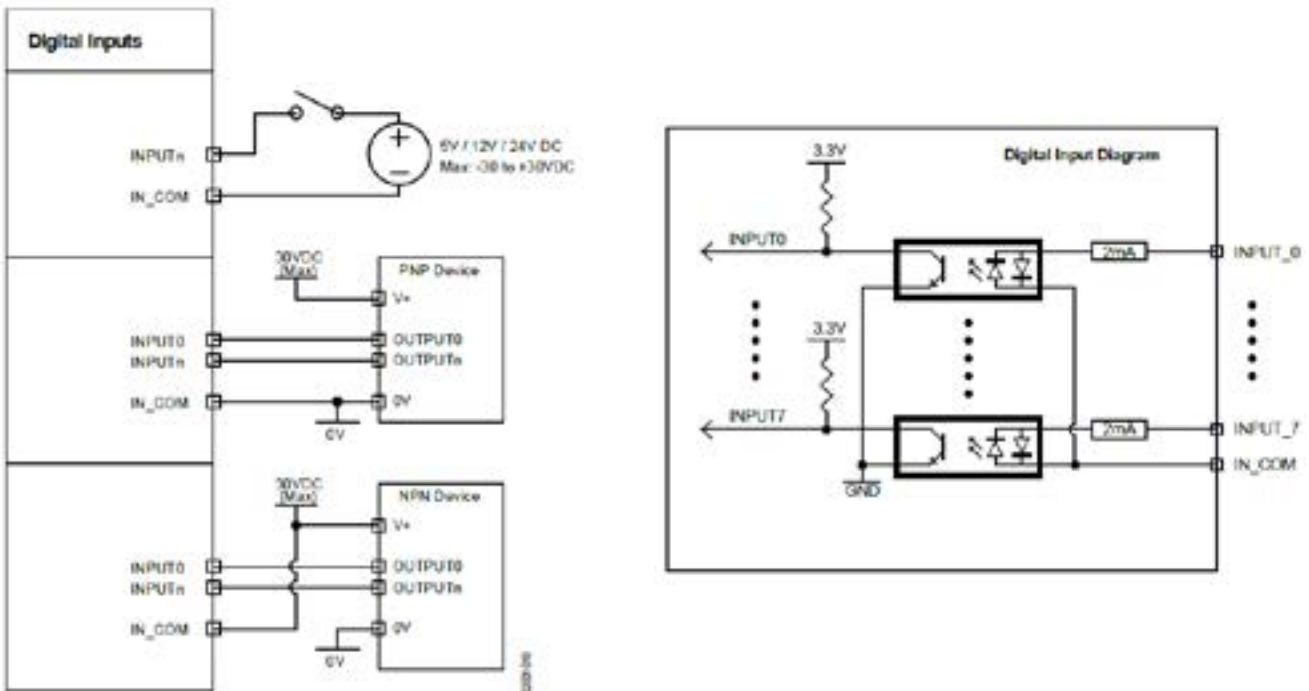
4.5.2 Functional Description

Read the Digital Inputs
The APIs read the 8 inputs simultaneously. Logical '1' is for high level input, and '0' is for low level input.
The Mode of Triggered Events
For each one of the 8 inputs, there are 3 triggered event modes which can be used in program and please refer to table 4-1. For example, INPUT0 is set as falling edge event, INPUT1 is set as rising edge event, and INPUT2 is set as change event.

Table 4-1 Mode of triggered event

Number	Mode	Descriptions	Program Behavior
1	Falling edge event	Input level change from high to low	Activate the user registered callback function
2	Rising edge event	Input level change from low to high	
3	Change event	Input level change from high to low or otherwise	

Input Signal Glitch Filter
The input signal glitch filter function is disabled by default.
The minimum Glitch Filter delay time is 10us, the maximum time is 3.5s, and the recommended time is 10ms for normal application. If this function is enabled, when the first 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 signal from mechanical switches, this function is very useful to avoid spurious input signals.
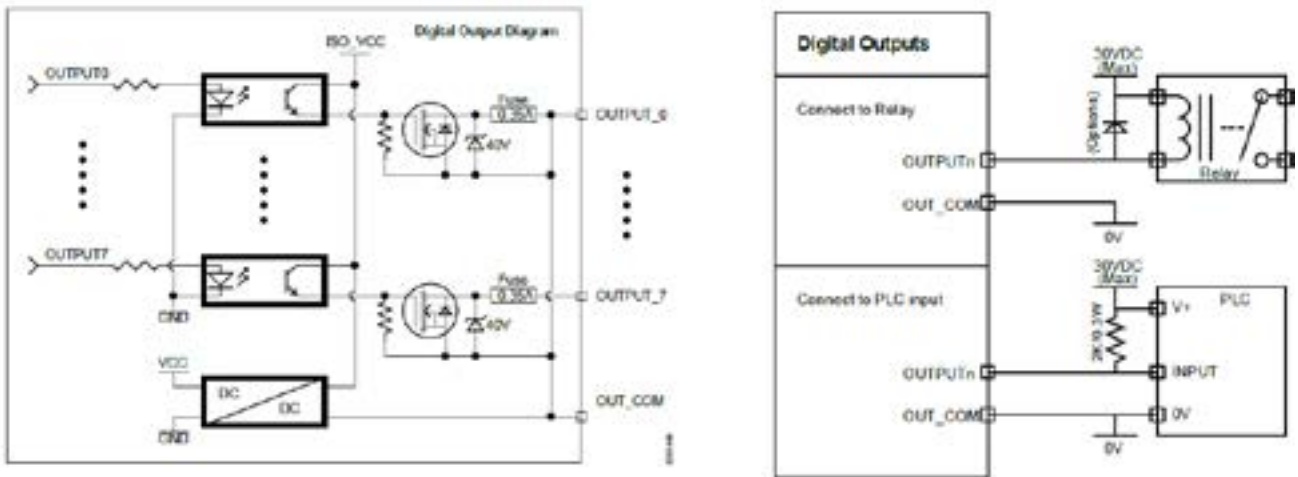
Input Delay
The time period between general input and user's program receiving message is called input delay time. This input delay time may be variable because of OS thread scheduling and user programming style, usually range from 0.2ms to 1ms.

4.6 Digital Output Ports

4.6.1 Electrical Specifications

The 9-pin connector with mark „OUTPUT" is for 8 channel digital outputs.
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 TVS onboard. The output saturation voltage Von is less than 0.2V@350mA, and leakage current Ioff-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.

4.6.2 Functional Description

This output delay time may be variable because of OS thread scheduling and user programming style, usually range from 0.2ms to 1ms.

4.7 RS232 Port

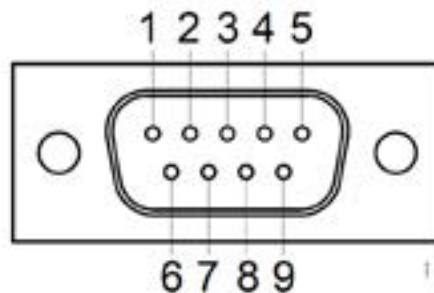The DB9 connector with mark „RS232" is for RS232 (COM1).

Table 4-2 RS232 port (COM1)

Number	Name	Type	Description	Note
2	RX	input	Input of RS232 (for external devices)	
3	TX	output	Output of RS232 (for external devices)	
5	GND	power	GND for RS232	
1,4,6,7,8,9	NC	NA	Not connected	

The other RS232 (COM2) port is a terminal type port, and is marked with "RS232 COM2". It is compatible with 16-24AWG wire.
The two RS232 ports support baud rate (bps): 300, 600, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

4.8 RS485 Port

The 5-pin connector with mark „RS485 COM4" is for RS485 (COM4) port. It is compatible with 16-24AWG wire. This isolated RS485 port supports baud rate (bps): 300, 600, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

4.9 Panel USB Ports

There are 2 USB3.0 ports and 1 USB2.0 port on the panel.
The Panel USB ports are for all kinds of USB peripherals, such as keyboard, mouse, USB flash drive etc. They can also be used for connection with USB camera.
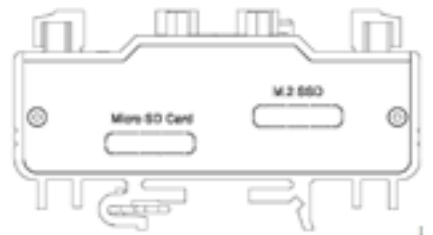
4.10 Internal USB2.0 Port

There is a special USB 2.0 port inside the camera case. User can use this port only when opening the rear panel. This internal USB port is designed for encryption USB dongle.
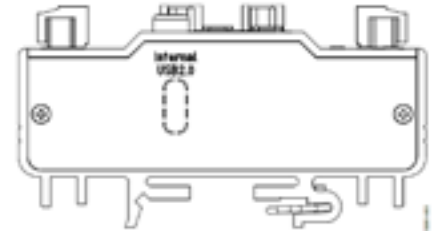
4.11 Micro SD Card Slot

There is a Micro SDXC card slot. This Micro SDXC card slot is hidden inside the device casing. You need to open the side cover to insert or remove the card.

4.12 M.2 SSD Slot

There is a M.2 SSD slot inside the controller. Its location is marked „M.2 SSD".

Note: This M.2 can only be pre-installed at the factory. If you need it, please specify when ordering.

This M.2 card slot only supports 2280 format (size 22x80mm) SATA SSD cards, and does not support NVMe SSD cards. It supports any capacity and can support the installation of OS systems as system disks.

4.13 Display Port

There are a HDMI port and a VGA display port. Both of them support resolution from VGA to 1080P. Depending on the display interface, user only needs to select one port to connect. If 2 displays are separately connected to these 2 ports, they will show same picture.

## 4.14 LED Indicators

There are 3 LED indicators on the panel.
The LED with mark "POWER" is for power indicator: red for power off, and green for normal operation. The other 2 LEDs with mark "STATUSn" are programmable green-red dual color LEDs for user.

4.15 Power Button

There is a self-lock push button with mark „POWER".
OS for Beaer2 series vision controller is highly customized by Q.VITEC to avoid any crash from power failure, which means Q.400SD-R02 series Vision controller can be powered off directly and no need to shut down from OS.

5 DIMENSIONS
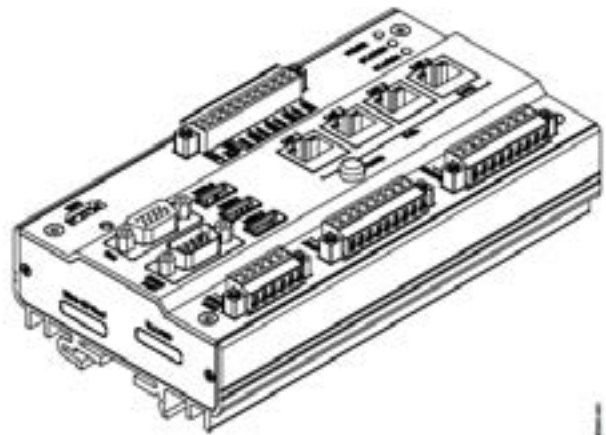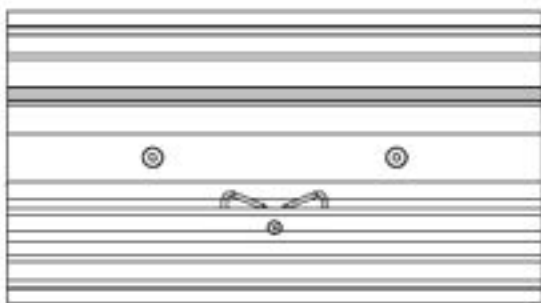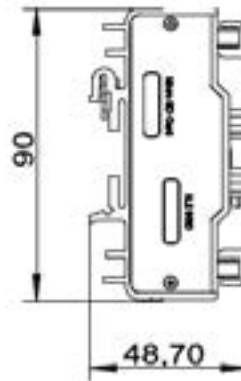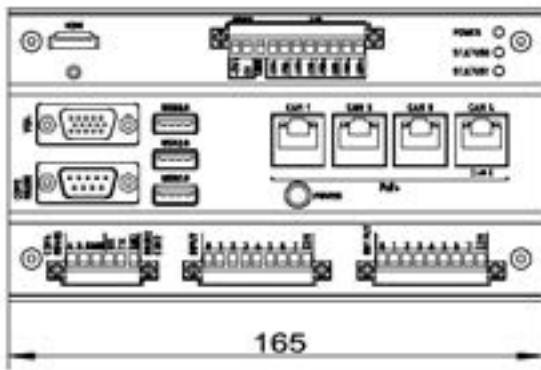
Note:
1. Unit: mm
2. Materials: aluminum with anodizing process
3. Color: silver gray

6 CONTACT

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