

OtO Photonics

Sensor & Control Board Product sheet

Description

This Specification contains information of Hamamatsu Sensor & Control Board. The Control Board is constructed by a 32 bit RISC core, a 16 bit ADC, and low power circuits. In the normal operation, the SpectraSmart software can communicate through a high speed USB2.0 port on PC. The programmable CCD & ADC timing generator inside the control board can control the different CCD types and read the ADC data back in high data rate. It also provides several interfaces to communicate with external devices, like GPIO or UART °

Hamamatsu Sensor	Model Name
S11639N-01	SE2030-Sensor+CB HB2030-Sensor+CB
G8160-03	SW1520-Sensor+CB
G13913-128GB	RS1680-Sensor+CB
S11510-1106N*	SE1050-Sensor+CB HB1050-Sensor+CB
S11511-1106	EE1053-Sensor+CB
S11850-1106	EE1063-Sensor+CB
Sony Sensor	Model Name
ILX563A	UM1280-Sensor+CB

* Due to the Intellectual Property Rights Infringement Litigation on Hamamatsu , S11510-1106N is not available to sell in U.S.A

* *S11510-1106N & S10420-1106N-01, 'N': The Protection glass is temporarily stick on the sensor by tape.

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OtO Photonics

Sensor & Control Board Datasheet

■	1. Specification Overview	3
■	2. Mainboard & Port Description	
2.1	CB-56M2 (for UM1280-Sensor+CB)	7
2.2	Z5Q3 (for SE1050-Sensor+CB)	8
2.3	Z5HB Back-thinned (for HB1050-Sensor+CB)	9
2.4	Z5Q2 SHA (for SW1520-Sensor+CB)	10
2.5	RS02 FX2 Rev_A (for RS1680-Sensor+CB)	11
2.6	Z5T Rev_B (For EE1053-Sensor+CB & EE1063-Sensor+CB)	12
2.7	Z5 HB Q2 SHA (For HB2030-Sensor+CB)	13
2.8	Z5 Q2 Rev_C (For SE2030-Sensor+CB)	14
■	Connect Port Overview	
3.1	USB Port	15
3.2	Extension Port	16
3.3	UART Port	17

OtO Photonics

Sensor & Control Board Datasheet

1. Specification Overview

Model Name	UM1280 -Sensor +CB	SE1050 -Sensor +CB	SW1520 -Sensor +CB	RS1680 -Sensor +CB	SE2030- Sensor+CB	
		HB1050 -Sensor +CB			HB2030- Sensor+CB	
Sensor Model Name	Sony ILX563A	S11510 -1106N	G8160-03	G13913- 128GB	S11639N-01	
Wavelength Respond(nm)	400-800	200-1100	900-1700		200-1100	
SensorType	High Sensitivity	NIR -Enhanced	InGaAs NIR Sensor		High Sensitivity CMOS	
Pixel Numbers	3000	2048	128		2048	
Sensor Board Size (WxLxH)	32.5*6*9 (Including connector)	59*15*5	58*12.5*5	13.5*20*2.1	59*13*7	
					50.4*14.5*6.1	
Sensor Board Screw Hole	na	*Screw hole*2 *M2*4 Hex Socket Head Cap Screws		na	*Screw hole*2 *M2*4 Hex Socket Head Cap Screws	
Control Board Model name	CB-56M2	Z5Q3 (SE)	Z5Q2 SHA	RS02 FX2	Z5 Q2 Rev_C (SE)	
		Z5HB Back-thinned (HB)			Z5 HB Q2 SHA (HB)	
Size(mm)	38*30*2.9	80*65*12 (SE & SW) 62.4*35*7 (HB)		38*38*7	77*65*17(SE) 62.4*35*7 (HB)	
Screw	*M2*4 Hex Socket Head Cap Screws	SE	*M2*5 screw *Spring Washer 2.3*4.2*0.5(d*D*t)	*M2*5 screw *Spring washer 2.3*4.2*0.5(d*D*t)	SE	**M2*5 screw *Spring Washer 2.3*4.2*0.5(d*D*t)
		HB	*M2x4 screw *M2 Flat Washer		HB	*M2x4 screw *M2 Flat Washer
Sensor to MB Cable	40mm	Sensor Cable 1 70mm Sensor Cable 2 55mm		70mm	na	70 mm

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Sensor & Control Board Datasheet

Contral Board Model Name	CB-56M2	Z5Q3 (SE)	Z5 Q2 SHA	Z5Q2 SHA	RS02 FX2
		Z5HB Back-thinned (HB)	Z5 HB Q2 SHA		
Sensor Port Pin	8	8 + 6	8	8	12 (FFC connector)
Interface	<ul style="list-style-type: none"> Mini USB UART GPIO 	SE : <ul style="list-style-type: none"> B type USB2.0 UART GPIO HB : <ul style="list-style-type: none"> Micro USB Special USB GPIO 		<ul style="list-style-type: none"> B type USB2.0 UART GPIO 	<ul style="list-style-type: none"> Micro USB GPIO
User Programmable Digital I/O	4				
GPIO Port	6 Pin GPIO	8 Pin GPIO			
UART Port	4 Pin	SE : 4 Pin HB : na	4 Pin		
CPU	32 bit RISC				8051
SystemClock	200MHz				48MHz
RAM	64 MByte DDR1				16KB internal RAM
ROM	8 MByte				144KByte
ADC	16 bit				
Power	<ul style="list-style-type: none"> Power require: 300mA at +5 VDC Supported voltage: 4.75-5.25 USB Vcc : +5.25VDC I/O : +5.5VDC 				<ul style="list-style-type: none"> Power require: 280mA at +5VDC Supply voltage : 4.5-5.5V

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Sensor & Control Board Datasheet




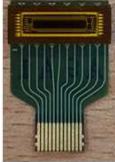
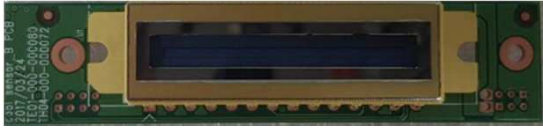

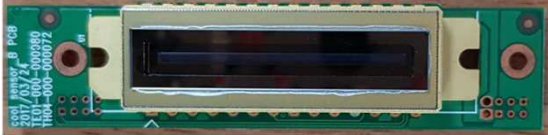
Model Name	EE1053-Sensor+CB	EE1063-Sensor+CB
Sensor Model Name	S11511-1106	S11850-1106
Wavelength Respond(nm)	200-1100	
Sensor Type	TEC NIR-enhance	TEC Etaloning improved
Pixel Numbers	2048	
Sensor Board Size (mm, WxLxH)	63*20*7(66*15*7)	
Sensor Board Screw Hole	*Screw hole*2 *M2*4, Hex Socket Head Cap Screws	
Contral Board Model Name	Z5T	
Size(mm)	125*76*16	
Screw	*M2*5 *M2*4 Hex Socket Head Cap Screws *Spring Washer 2.3*4.2*0.5 (d*D*t)	
Sensor to MB Cable	2 Cable 60 mm	
Sensor Port Pin	8+6+2+2	
Interface	B type USB2.0, UART, GPIO	
User Programmable Digital I/O	4	
GPIO Port	8 Pin GPIO	
UART Port	4 Pin	
CPU	32 bit RISC	
System Clock	200MHz	
RAM	64 MByte DDR1	
ROM	8 MByte	
ADC	16 bit	
Power	Power require: 330mA at +5 VDC TEC power require: 500mA at + 5VDC Supply voltage : 4.75-5.25 USB Vcc : +5.25VDC I/O: +5.5VDC	

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Sensor Board	Size (mm, WxLxH)
ILX563A	32.5*6*9 (Including Port)
	
S11510-1106N	59*15*5
	
G8160-03	58*12.5*5
	
G13913-128GB	13.5*20*2.1 (Including FFC)
	
S11511-1106	66*15*7
	
S11850-1106	63*20*7
	
	66*15*7

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Sensor & Control Board Datasheet

2. Mainboard & Port Description

2.1 CB-56M2 (for UM1280-Sensor+CB)



UART Port (Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Power	Power	+5V
2	Output	TX (UART)	RISC Output
3	Input	RX (UART)	RISC Input
4	GND	GND	Ground

Sensor Port (Pitch 1.0 mm)

#Pin	Direction	Name	Description
1	Output	DRV_SH	Reserved PIN
2	Output	Spectro_GAIN	Reserved PIN
3	Input	Spectro_data	Data
4	GND	GND	Ground
5	Output	DRV_ROG	Read out gate pulse
6	Output	DRV_CLK	CLK
7	Output	PWR	5V
8	GND	GND	Ground

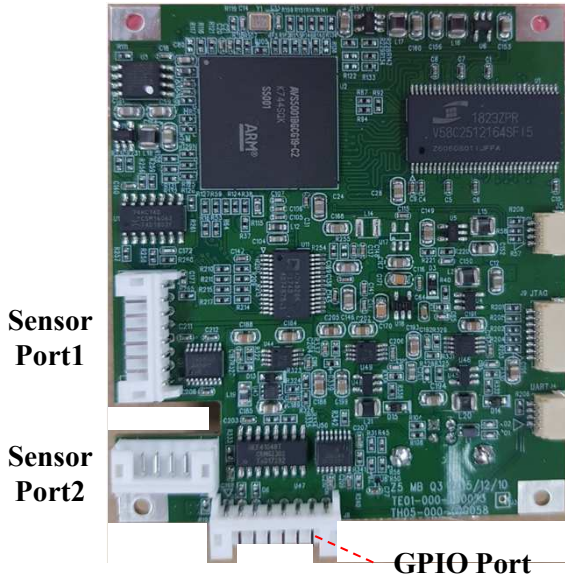
GPIO (Pitch 1.0 mm)

#Pin	Direction	Name	Function Description
1	Power	Power	+5V
2	Input/Output	GPIO1	General purpose input output pin. This provides the extension for external device control or synchronization.
3	Input/Output	GPIO2	General purpose input output pin. This provides the extension for external device control or synchronization.
4	Input/Output	GPIO3	General purpose input output pin. This provides the extension for external device control or synchronization.
5	Input/Output	GPIO4	General purpose input output pin. This provides the extension for external device control or synchronization.
6	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.2 Z5Q3 (for SE1050-Sensor+CB)

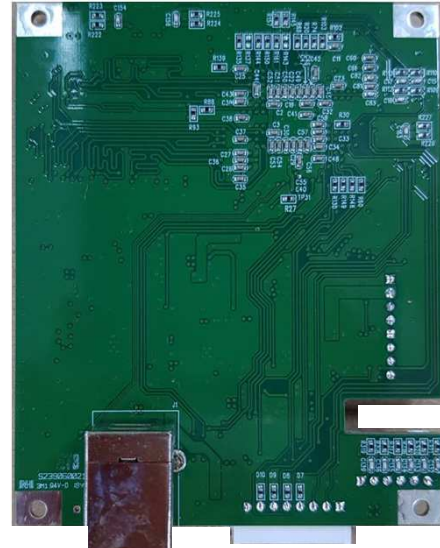


UART Port
(Not Available)

JTAG Port
(Not Available)

UART Port
(Not Available)

GPIO Port



USB

GPIO Port (Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Output
3	Input	UART RX	RISC Input
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input out/put pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

Sensor Port1 (Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Reset Gate	Reset
2	Output	Power	32V
3	Output	Power	13V
4	Input	Spectro_data	Data
5	GND	GND	Ground
6	Output	Power	20V
7	x	x	x
8	x	x	x

Sensor Port2(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	P4H	CCD horizontal register clock-4
2	Output	P3H	CCD horizontal register clock-3
3	Output	P2H	CCD horizontal register clock-2
4	Output	P1H	CCD horizontal register clock-1
5	Output	P1V	CCD vortal register clock-1
6	Output	P2V	CCD vortal register clock-2

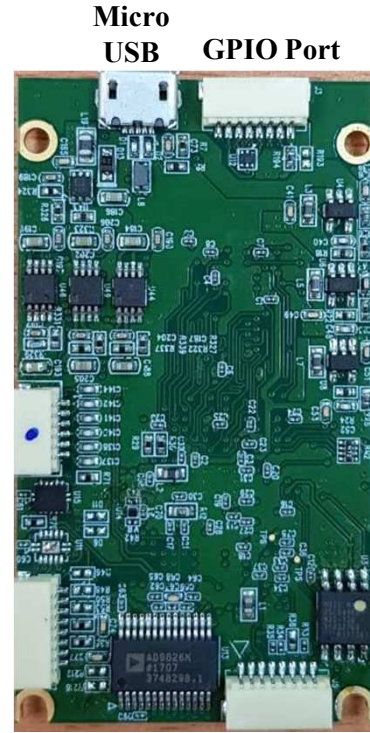
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► 2.3 Z5HB Back-thinned (for HB1050-Sensor+CB)



Special USB



Micro USB GPIO Port

Sensor Port2

Sensor Port1

GPIO Port
(Not available)

Sensor Port1(Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Reset Gate	Reset
2	Output	Power	32V
3	Output	Power	13V
4	Input	Spectro_data	Data
5	GND	GND	Ground
6	Output	Power	20V
7	x	x	x
8	x	x	x

Sensor Port2(Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	P4H	CCD horizontal register clock-4
2	Output	P3H	CCD horizontal register clock-3
3	Output	P2H	CCD horizontal register clock-2
4	Output	P1H	CCD horizontal register clock-1
5	Output	P1V	CCD vertical register clock-1
6	Output	P2V	CCD vertical register clock-2

GPIO Port (Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Out
3	Input	UART RX	RISC In
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input /output pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

Special USB Port (Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+3.3V
2	2 way	Data-	USB-
3	2 way	Data+	USB+
4	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.4 Z5Q2 SHA (for SW1520-Sensor+CB)



Sensor Port

GPIO Port

UART Port
(Not Available)
JTAG Port
(Not Available)
UART Port
(Not Available)



USB

Sensor Port(Pitch 2.0 mm)

#Pin	Direction	Name	Description
1	Output	DRV_SH	Reserved PIN
2	Output	Spectro_GAIN	Reserved PIN
3	Input	Spectro_Data	Data
4	Ground	Ground	Ground
5	Output	DRV_ROD	Read out gate pulse
6	Output	DRV_CLK	CLK
7	Output	Spectro_PWR	5V
8	GND	GND	Ground

GPIO Port (Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Out
3	Input	UART RX	RISC In
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input /output pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.5 RS02 FX2 Rev_A (for RS1680-Sensor+CB)



GPIO Port(Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Out
3	Input	UART RX	RISC In
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input /output pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

Sensor Port(Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	DRV_SH	Reserved PIN
2	Output	Spectro_GAIN	Reserved PIN
3	Input	Spectro_Data	Data
4	GND	GND	Ground
5	Output	DRV_ROD	Read out gate pulse
6	Output	DRV_CLK	CLK
7	Output	Spectro_PWR	5V
8	GND	GND	Ground

GPIO Port() (Pitch 1.0mm)

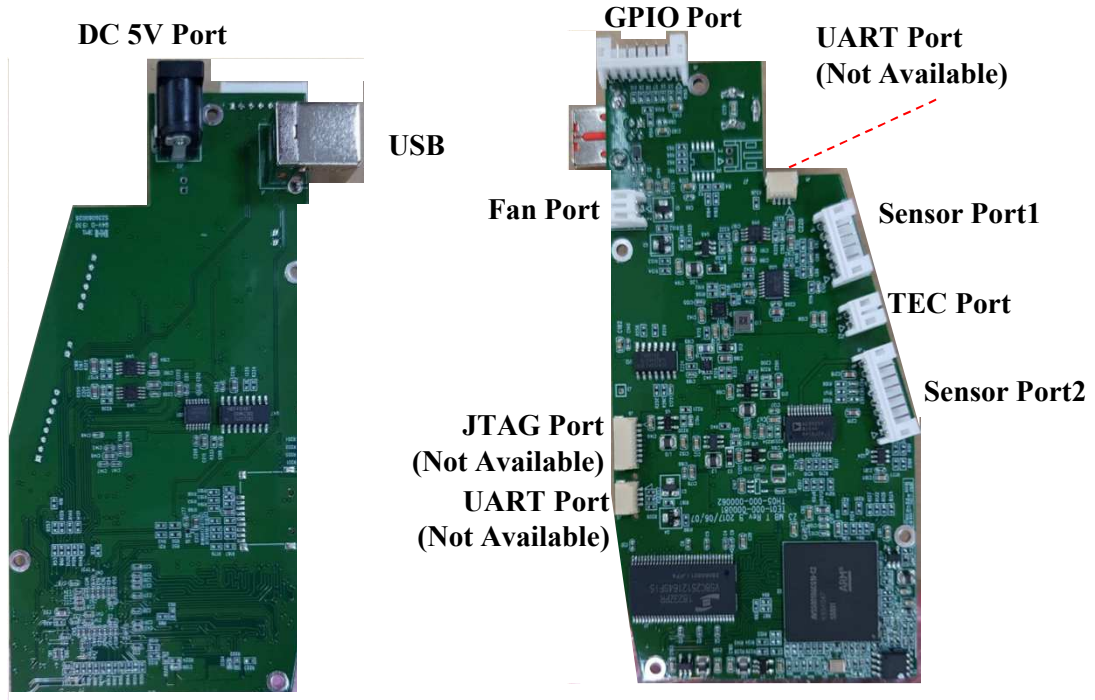
#Pin	Direction	Name	Description
1	NC	NC	NC
2~7	-	-	Reserved PIN
8	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.6 Z5T

(For EE1053-Sensor+CB & EE1063-Sensor+CB)



Sensor Port1(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Reset Gate	Reset
2	Output	Power	32V
3	Output	Power	13V
4	Input	Spectro_data	Data
5	GND	GND	Ground
6	Output	Power	20V
7	x	x	x
8	x	x	x

Fan Port(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	GND	GND	Ground

TEC Port(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	GND	GND	Ground

Sensor Port2(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	P4H	CCD horizontal register clock-4
2	Output	P3H	CCD horizontal register clock-3
3	Output	P2H	CCD horizontal register clock-2
4	Output	P1H	CCD horizontal register clock-1
5	Output	P1V	CCD vertical register clock-1
6	Output	P2V	CCD vertical register clock-2

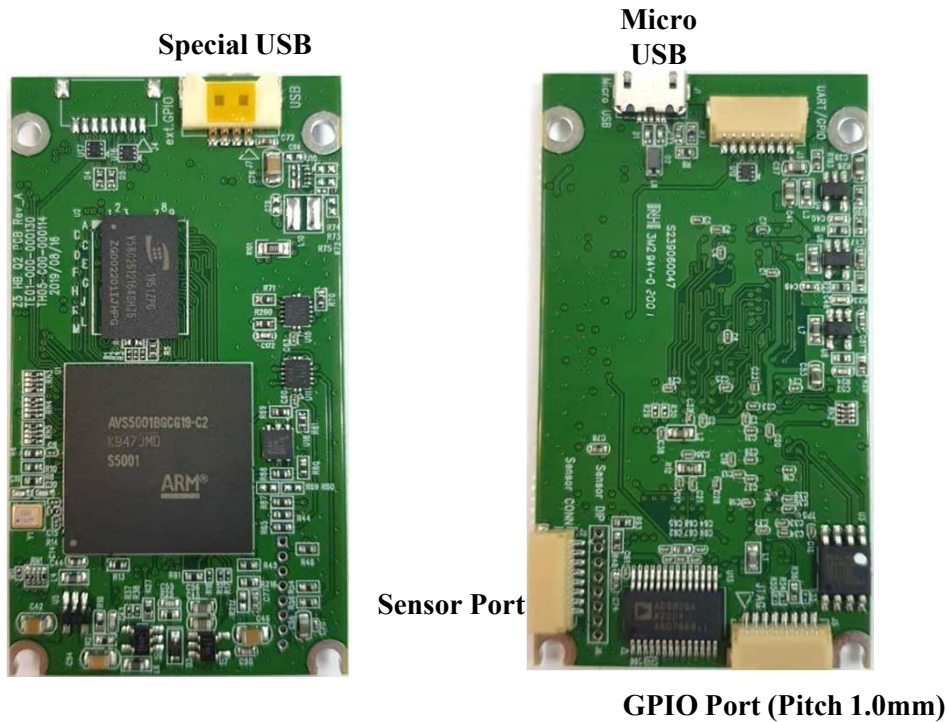
GPIO Port(Pitch 2.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Out
3	Input	UART RX	RISC In
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input /output pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.7 Z5 HB Q2 SHA (For HB2030-Sensor+CB)



Sensor Port

#Pin	Direction	Name	Description
1	Output	CCD_SH	Reserved PIN
2	Output	CCD_Gain	Reserved PIN
3	Input	CCD_Output	Data
4	GND	GND	Ground
5	Output	CCD_ROG	Read out gate pulse
6	Output	CCD_CLK	CLK
7	Output	Power	+5V
8	GND	GND	Ground

Special USB (Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+3.3V
2	2 way	Data-	USB-
3	2 way	Data+	USB+
4	GND	GND	Ground

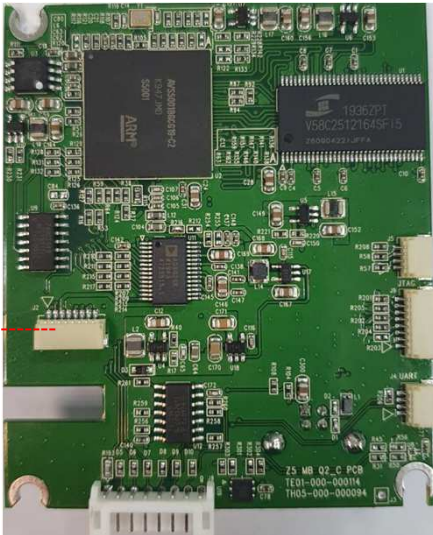
GPIO Port (Pitch 1.0mm)

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART TX	RISC Out
3	Input	UART RX	RISC In
4	Output	GPIO0	General purpose input /output pin.
5	Output	GPIO1	General purpose input /output pin.
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_IN	External Trigger Input Signal.
8	GND	GND	Ground

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Sensor & Control Board Datasheet

► 2.8 Z5 Q2 Rev_C (For SE2030-Sensor+CB)



Sensor Port

GPIO Port

UART
(Not Available)
JTAG Port
(Not Available)
UART Port
(Not Available)



USB

GPIO Port

#Pin	Direction	Name	Description
1	Output	Power	+5V
2	Output	UART_TXD	RISC Out
3	Input	UART_RXD	RISC In
4	Output	GPIO0	Reserved PIN
5	Output	GPIO1	Reserved PIN
6	Output	LS_ON	Light Source Turn ON.
7	Input	Trigger_In_1	External Trigger Input Signal.
8	GND	GND	Ground

Sensor Port (Pitch 2.0 mm)

#Pin	Direction	Name	Description
1	Output	CCD_SH	Reserved PIN
2	Output	CGAIN	Reserved PIN
3	Input	Spectro_Data	Data
4	GND	GND	Ground
5	Output	CCD_ROG	Read out gate pulse
6	Output	CCD_CLK	CLK
7	Output	Power	5V
8	GND	GND	Ground

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Sensor & Control Board Datasheet

■ Connect Port Overview

▶ 4.1 USB Port

Users can connect the SpectraSmart software on PC by PC USB port which is setup on control board.

- ❑ B type USB 2.0 @ 480Mbps (High-speed)
- ❑ Micro USB @480Mbps (High-speed)
- ❑ Mini USB 480Mbps (High-speed)
- ❑ Supply board power

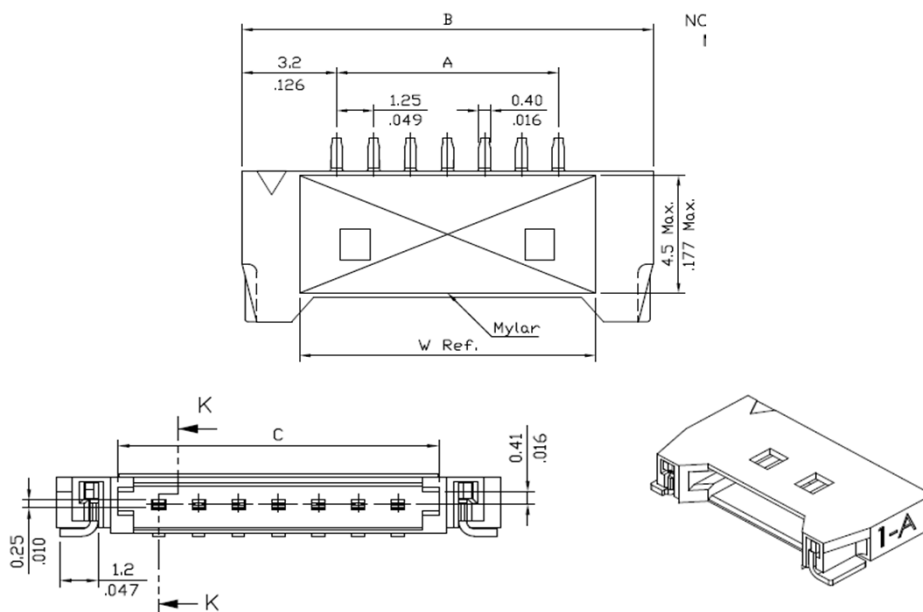


Fig. 1: Special USB 1.0 mm 4 pin

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► 3.2 GPIO Port & Pitch 2.0mm Port

In the PC based operation, users can setup output with high or with low level by SpectraSmart software. The SpectraSmart software also can receive the I/O status through the USB communication. If users need the special timing generation (like single pulse or PWM), it provides the flexibility to implement it.

GPIO Recommended Operating Levels:: **GPIO Absolute Maximum Ratings are**

$V_{IL(max)} = 0.8V$

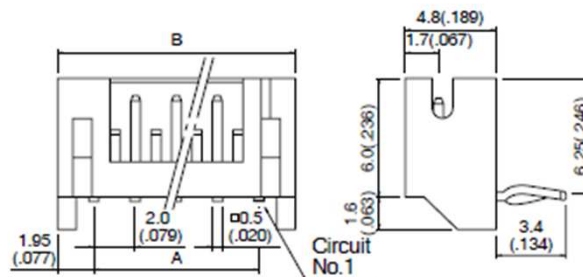
$V_{IH(min)} = 2V$

as follows:

$V_{IN(min)} = -0.3V$

$V_{IN(max)} = 5.5V$

Side entry type



Cir- cuits	Model No.		Dimensions mm(in.)		Q'ty / box	
	Top entry type	Side entry type	A	B	Top entry type	Side entry type
8	B 8B-PH-K-S	S 8B-PH-K-S	14.0(.551)	17.9(.705)	500	250

Fig.2 Pitch 2.0mm Port

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Sensor & Control Board Datasheet

► 3.3 UART Port & Pitch 1.0mm pin Port

For the board space consideration, we uses the 4 pin 1.0 mm pitch connector for the UART communication.

UART Recommended Operating Levels::

VIL(max) = 0.8V

VIH(min) = 2V

UART Absolute Maximum Ratings are as follows:

VIN(min) = -0.3V

VIN(max) = 5.5V

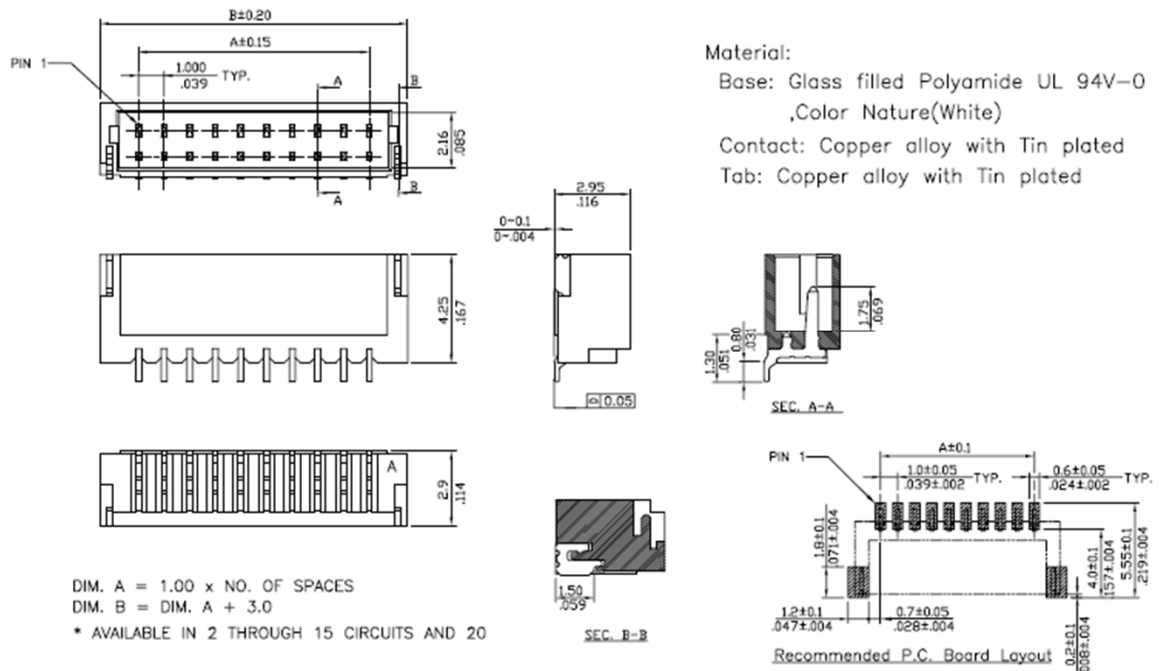


Fig. 3: Pitch 1.0mm Port