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Driver circuit for photodiode array with amplifier

C9118-01

Compact, easy-to-use driver circuit

The C9118-01 CMOS driver circuit is designed for Hamamatsu photodiode arrays with amplifier. It operates by just inputting two signals (M-CLK, M-RESET) and a single +5 V power supply. It is assembled on a compact board measuring 56 × 48 mm and allows downsizing of equipment.
It is possible to configure a long and narrow image sensor by combining this product with a compatible photodiode array with amplifier (sold separately) and arranging multiple combinations in line.

Features

- **Single power supply (+5 V) operation**
- **Operation with two input signals (M-CLK, M-RESET)**
- **Compact and thin: 56 × 48 × 5.2 mm**
- **Configuring a long and narrow image sensor makes it possible to read a wide range.**

Applications

- **Various types of image acquisition**
- **Optical detection equipment**
- **X-ray non-destructive inspection**

Compatible photodiode arrays with amplifier (sold separately)

Type no.	Number of elements	Element size (pitch × height)
S11865-64, S11865-64G	64	0.8 mm × 0.8 mm
S11865-128, S11865-128G	128	0.4 mm × 0.6 mm
S11866-128-02, S11866-128G-02	128	0.8 mm × 0.8 mm
S11866-64-02, S11866-64G-02	64	1.6 mm × 1.6 mm

Note: These circuits do not support the S11865-256 and S11865-256G.

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vcc	Ta=25 °C	+7	V
Digital input voltage	-	Ta=25 °C	5	V
Operating temperature	Topr	No dew condensation*1	0 to +50	°C
Storage temperature	Tstg	No dew condensation*1	0 to +70	°C

*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

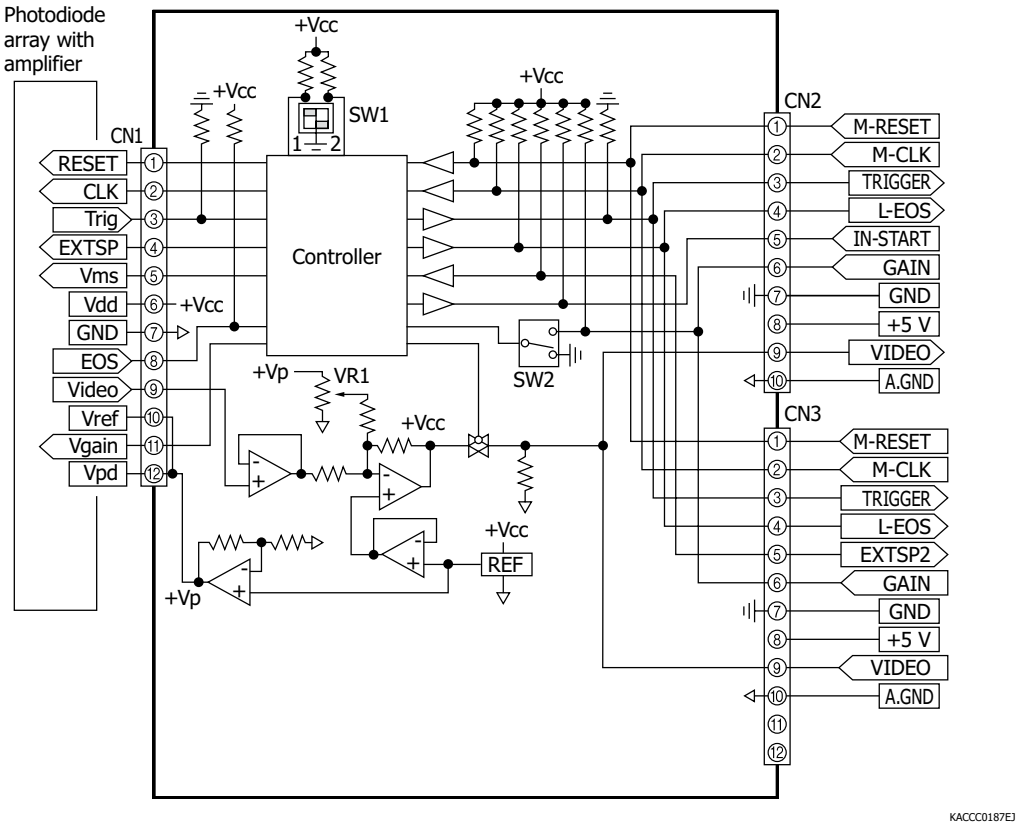
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Specifications (Ta=25 °C)

Parameter		Symbol	Min.	Typ.	Max.	Unit
Rated voltage		-	4.9	5.0	5.2	V
Current consumption		+Is	-	75	80	mA
Digital input	High level	VIH	2.0	-	5	V
	Low level	VIL	0	-	0.8	V
M-RESET pulse width (Low level)		TpwstRESET1	10	-	-	µs
M-CLK frequency		f(CLK)	40	-	4000	kHz
Digital rise/fall times		tTLH/tTHL	-	20	30	ns
Data rate		fV	10	-	1000	kHz
Offset output		Voffset	-	0.5	-	V
VIDEO saturation output*2		Vsat	-	4.5	-	V

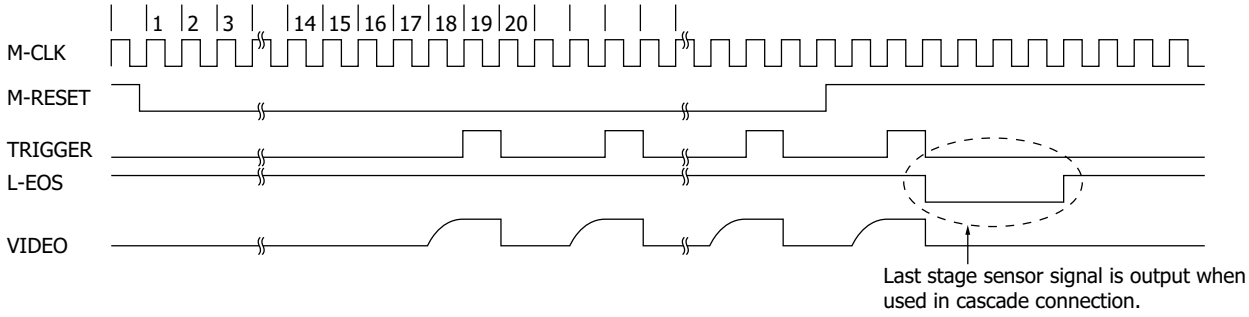
*2: With respect to the offset value

Block diagram (C9118-01)

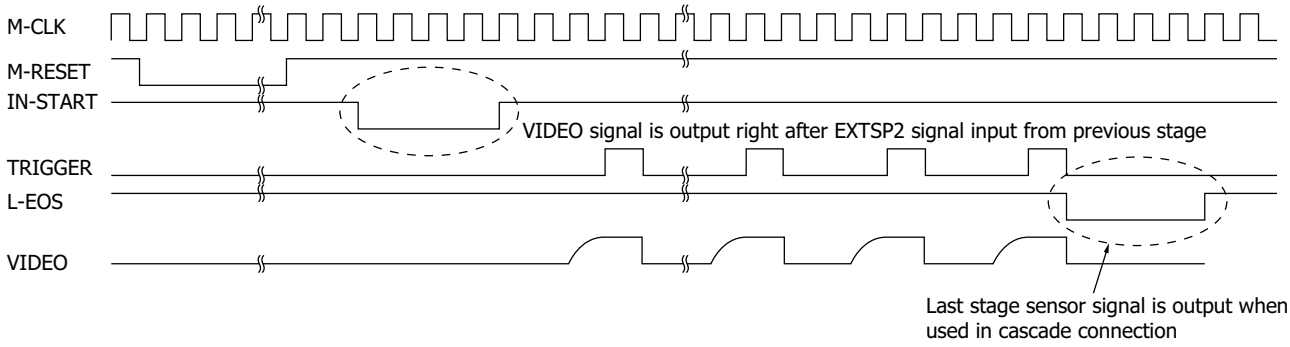


Timing chart

Timing chart of first stage sensor when used parallel or in cascade connection



Timing chart of second and subsequent stage sensors when used in cascade connection



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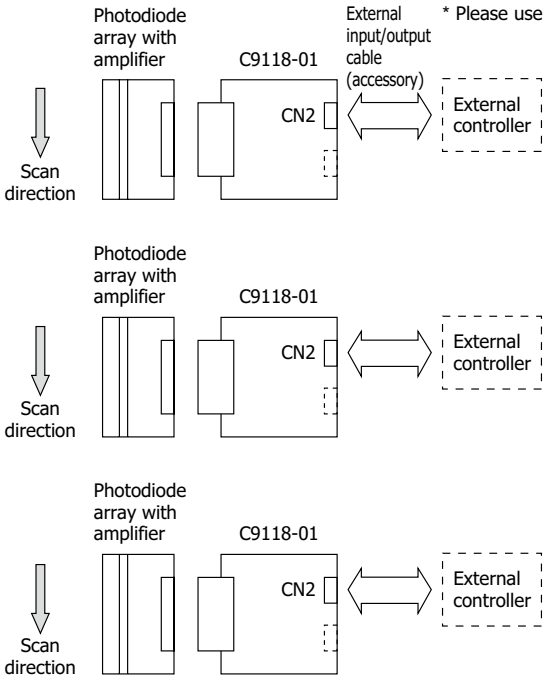
Connection examples

Parallel readout example*3

■ Simultaneous integration/parallel output (effective for high-speed processing)



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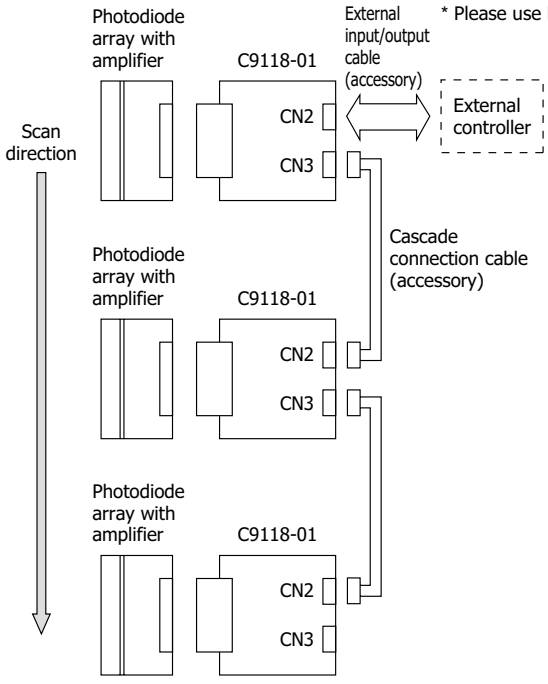
Cascade readout example*3

■ Simultaneous integration/serial output (simplifies external processing circuit)



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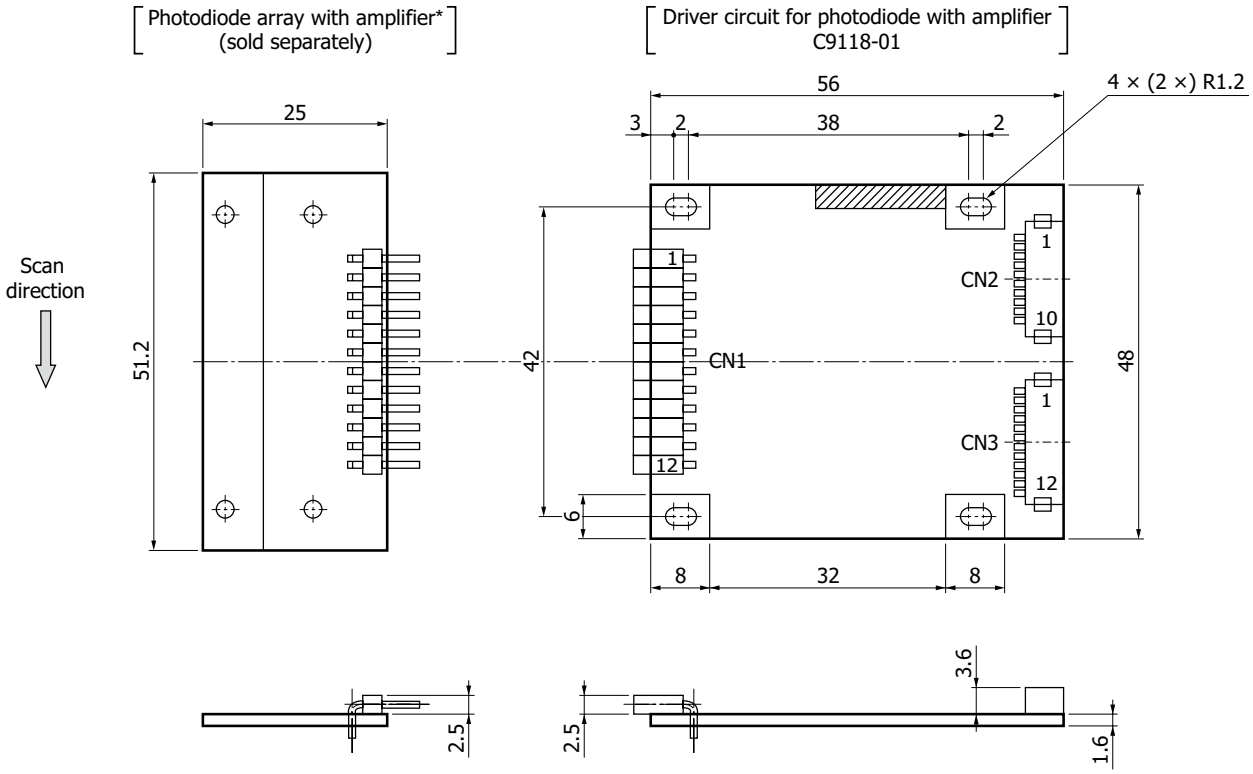
*3: Switch setting is required [see Readout settings (P.7)].

Dimensional outline (unit: mm)



* S11865-64, S11865-64G, S11865-128, S11865-128G
Note: It is also compatible with the S11866 series.

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Pin assignment of I/O connector

■ CN1 [Connector type: 801-87-012-20-002101 PRECI-DIP (made by DURTAL) or equivalent]

Pin no.	Terminal Name	I/O	Description
1	RESET	O	Sensor scan start signal. Pulse width at High level nearly equals sensor integration time.
2	CLK	O	Sensor scan sync signal. Sensor starts scanning in synchronization with this signal.
3	Trig	I	For A/D conversion timing signals. Positive logic
4	EXTSP	O	High level at first stage during parallel or serial readout. At second and subsequent stages during serial readout, this outputs the EOS pulse of preceding stage.
5	Vms	O	High level at first stage during parallel or serial readout. At second and subsequent stages, this sets to Low level.
6	Vdd	O	Sensor supply voltage
7	GND	-	Sensor GND
8	EOS	I	EOS (end of scan) signal of sensor. Negative logic
9	Video	I	Video output signal. Negative polarity
10	Vref	O	Reference voltage
11	Vgain	O	Sensor gain switching H: high gain, L: low gain
12	Vpd	O	Photodiode voltage

■ CN2 [Connector type: DF13-10P-1.25H (50) (made by Hirose Electric)]

Used to connect the first stage to an external I/O during parallel readout or serial readout

For the second and subsequent stages during serial readout, CN2 is used to connect to CN3 at preceding stage.

Pin no.	Terminal Name	I/O	Description
1	M-RESET	I	Sensor scan start signal. Pulse width at High level nearly equals sensor integration time.
2	M-CLK	I	Sensor scan sync signal. Sensor and circuit start operating in synchronization with this signal.
3	TRIGGER	O	For A/D conversion timing signals. Positive logic
4	L-EOS	O	EOS (end of scan) signal of all sensors during parallel or serial readout. Negative logic
5	IN-START	I	NC (no connection) at first stage during parallel or serial readout. At second and subsequent stages during serial readout, this receives the EOS pulse of preceding stage.
6	GAIN	I	External setting for sensor gain H: high gain, L: low gain
7	GND	-	Circuit GND
8	+5 V	I	+5 V power supply
9	VIDEO	O	Video output signal. Positive polarity
10	A.GND	O	Video GND

■ CN3 [Connector type: DF13-12P-1.25H (50) (made by Hirose Electric)]

Used to connect to CN2 at next stage during serial readout.

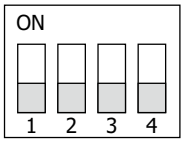
Pin no.	Terminal Name	I/O	Description
1	M-RESET	I	Sensor scan start signal. Pulse width at High level nearly equals sensor integration time.
2	M-CLK	I	Sensor scan sync signal. Sensor starts scanning in synchronization with this signal.
3	TRIGGER	O	For A/D conversion timing signals. Positive logic
4	L-EOS	O	EOS (end of scan) signal of all sensors during parallel or serial readout. Negative logic
5	EXTSP2	O	Video signal scan start signal at second stage during serial readout. Negative logic
6	GAIN	I	External setting for sensor gain H: high gain, L: low gain
7	GND	-	Circuit GND
8	+5 V	I	+5 V power supply
9	VIDEO	O	Video output signal. Positive polarity
10	A.GND	O	Video GND
11	NC	-	No connection
12	NC	-	No connection

Note: CN3 is installed only for serial readout.

Pin no. 1 to 4 and 6 to 10 connect to the same pin No. of CN2 as common lines.

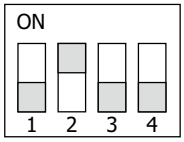
Readout settings

Parallel readout	Serial readout



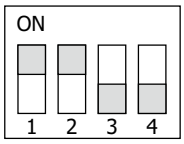
Set SW1 and SW2 to OFF as shown at left.
(SW3 and SW4 have no connection)

<First stage setting>



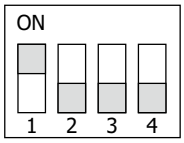
Set SW1 to OFF and SW2 to ON as shown at left.
(SW3 and SW4 have no connection)

<Second stage to second from last stage setting>



Set SW1 and SW2 to ON as shown at left.
(SW3 and SW4 have no connection)

<Last stage setting>



Set SW1 to ON and SW2 to OFF as shown at left.
(SW3 and SW4 have no connection)

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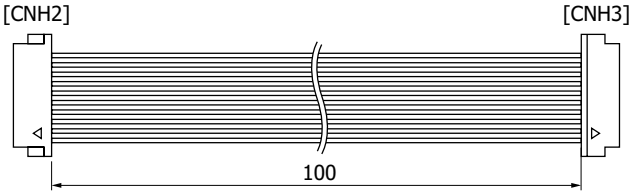
Accessory (unit: mm)

If necessary, cut the cables with a nipper, etc., and separate the [CNH3] part shown below.

Connector [CNH2]: DF13-10S-1.25C (Hirose Electric)
[CNH3]: DF13-12S-1.25C (Hirose Electric)
Terminal : DF13-2630SCFA (Hirose Electric)
Cable : Conforms to UL1061 AWG28



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■ Pin connections [CNH3]

Pin no.	Cable color	Pin no.	Cable color
1	Brown	7	Purple
2	Red	8	Gray
3	Orange	9	White
4	Yellow	10	Black
5	Green	11	No cable
6	Blue	12	No cable

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer

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Cat. No. KACC1087E16 Nov. 2022 DN