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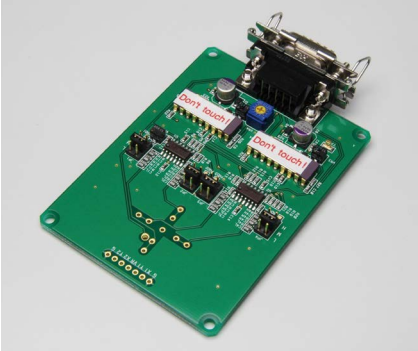
Signal processing circuit for 2-D PSD

C4674-01



Circuit board for easier 2-D PSD operation

The C4674-01 is a DC signal processing circuit for two-dimensional PSD. It is suitable for displacement measurements using DC light.

Features

- **No complicated adjustments required**
  Position measurement of a light spot can be made simply by mounting 2-D PSD.
- **Output voltage directly representing the position data**
  The position (mm) of a light spot from the PSD center is obtained as an output voltage (V).
- **Accurate position sensing**
  Position data of light spot is independent of incident light intensity.
- **Three sensitivity ranges**
- **Compact design**
  Head amp, signal addition/subtraction circuits, and analog divider circuit are mounted on a compact PC board.

Applications

- **Displacement measurements using DC light**
- **Various studies using 2-D PSD**
- **Performance evaluation of 2-D PSD**

Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Value	Unit
Supply voltage	Vs max	±18	V
Operating temperature*1	Topr	0 to +50	°C
Storage temperature*1	Tstg	-10 to +60	°C
Input current	Iin max	1×10^{-2}	A

*1: No dew condensation
When there is a temperature difference between a product and the surrounding area in high humidity environments, 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, Vs=±15 V)

Parameter			Symbol	Condition		Min.	Typ.	Max.	Unit
Conversion impedance			Zt	*2	H range	-	1×10^6	-	V/A
					M range	-	1×10^5	-	
					L range	-	1×10^4	-	
Input photocurrent			Ip	*3	H range	1×10^{-6}	-	1×10^{-5}	A
					M range	1×10^{-5}	-	1×10^{-4}	
					L range	1×10^{-4}	-	1×10^{-3}	
Y-direction head amplifier differential output (V1), X-direction head amplifier differential output (V2)	Cutoff frequency		fc	-3 dB	Lower	-	DC	-	kHz
					Upper	12	16	-	
	Output voltage	High	VOH			+13.5	+13.8	-	V
		Low	VOL			-	-13.8	-13.5	
	Output noise voltage		Vn	*5		-	2	-	mVp-p
	Output offset voltage		Vos	*5		-5	-	+5	mV
Incident light level monitor output (V3)	Cutoff frequency		fc	-3 dB	Lower	-	DC	-	kHz
					Upper	12	16	-	
	Output voltage	High	VOH			+13.5	+13.8	-	V
		Low	VOL			-	0	-	
	Output noise voltage		Vn	*5		-	2	-	mVp-p
	Output offset voltage		Vos	*5		-5	-	+5	mV
Y-direction position output (V4), X-direction position output (V5)	Cutoff frequency		fc	-3 dB	Lower	-	DC	-	kHz
					Upper	12	16	-	
	Maximum output amplitude voltage		Vfs	Factory setup prior to shipping*6		±6.8	±7	±7.2	V
	Output noise voltage		Vn	*5		-	5	-	mVp-p
	Output offset voltage		Vos	*5		-70	-	+70	mV
Referance voltage			Vref	*6		+2	-	+10	V
Reverse voltage for PSD			VR	Factory setup prior to shipping*7		+4.9	+5	+5.1	V
Operating supply voltage			Vs	*8		±14.5	±15	±15.5	V
Current consumption			Is	*5		-	±15	-	mA

*2: Factory setup prior to shipping is M range. The range can be switched with the jumper on the board.
*3: Photocurrent Ip with PSD installed (total input signal). PSD does not operate correctly if the input signal current is outside the specified range.
*4: Output response time 10 to 90%
*5: With no PSD installed. Current signal that substitutes for PSD photocurrent (L range: X1=X2=Y1=Y2=200 µA, M range: X1=X2=Y1=Y2=20 µA, H range: X1=X2=Y1=Y2=2 µA) is input. When maximum output amplitude voltage Vfs=±7 V is set.
*6: Factory setup prior to shipping is 7 V. Adjustable with a volume resistor on the board according to the PSD type to be used.
*7: Factory setup prior to shipping is +5 V. The voltage can be adjusted in the range of 0 to +14 V with a variable resistor on the board.
*8: Switching power supplies are not supported. Use a series power supply (with 3 mVp-p or less ripple voltage).

Combination with a PSD

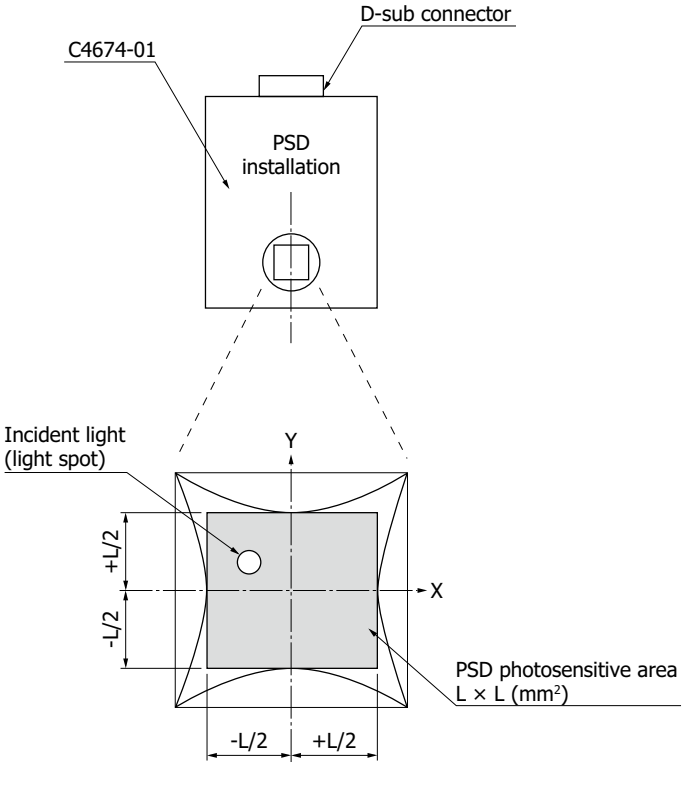
A PSD is installed (soldered) on the signal processing circuit.
Note: PSDs are sold separately.

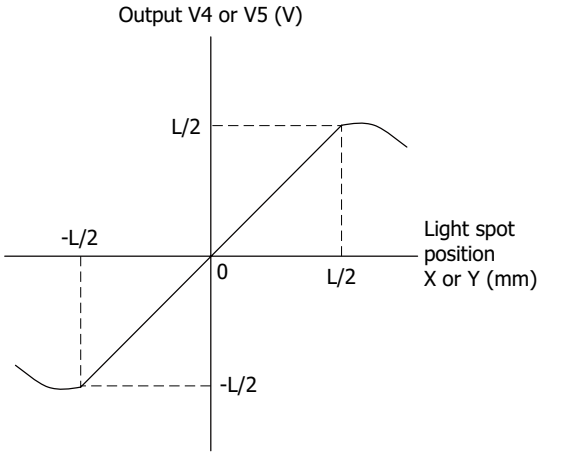
Type no.	Photosensitive area size (mm)	Position resolution*9 (µm)	Package (mm)	Installation on board	Using dedicated board	External*10 attachment
S2044	4.7 × 4.7	2	Metal (TO-8 ϕ14)	○	×	○
S5990-01	4 × 4	1.7	Ceramic chip carrier (8.8 × 10.6)	×	○	○
S5991-01	9 × 9	3.8	Ceramic chip carrier (14.5 × 16.5)	×	○	○

*9: Reference value. When maximum output amplitude voltage Vfs=±7 V is set.
*10: Wiring using shielded wires or AWG#26 or equivalent twisted pair wires (no longer than 30 cm) is recommended.

PSD and output voltage

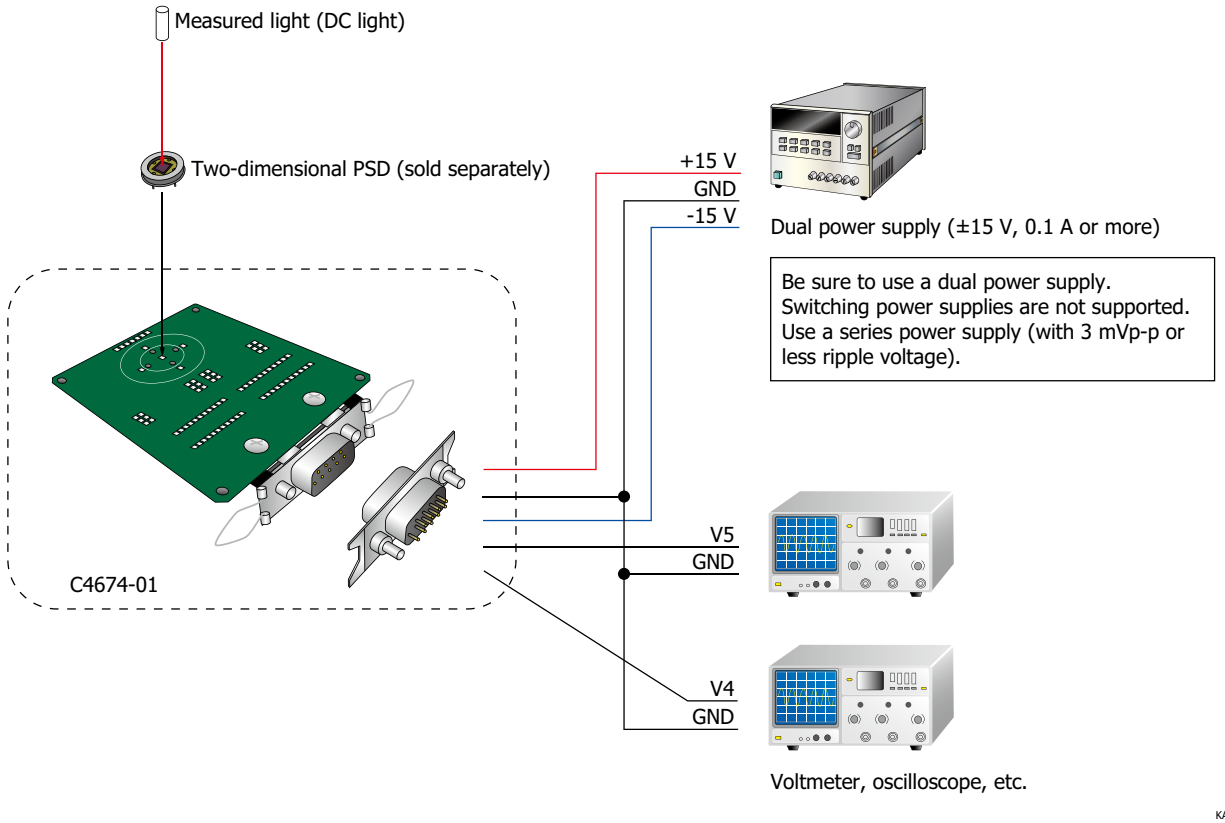
With the D-sub connector on top, the output corresponding to the horizontal position (converted output voltage of the X position) is output from D-sub connector terminal No. 1 (V5), and the output corresponding to the vertical position (converted output voltage of the Y position) is output from D-sub connector terminal No. 2 (V4).





Parameter	Symbol	Two-dimensional PSD			Unit
		S2044	S5990-01	S5991-01	
Photosensitive area length	L	4.7	4	9	mm
Output voltage amplitude	V4 (X)	±2.35	±2	±4.5	V
	V5 (Y)	±2.35	±2	±4.5	V

Connection example



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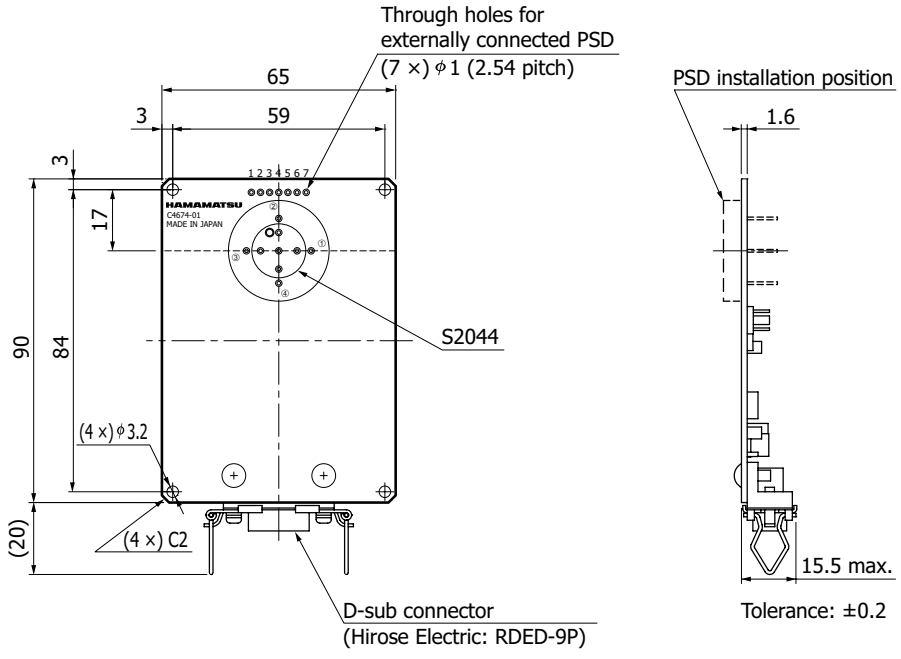
Dimensional outline (unit: mm)



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Pin connections

■ D-sub connector

Pin no.	Name	Content
1	V5	X position signal output
2	V4	Y position signal output
3	+V	+15 V
4	-V	-15 V
5	G	GND
6	V3	Sum signal output (incident light level monitor output)
7	V2	X position head amp differential output
8	V_R	PSD reverse bias voltage monitor output
9	V1	Y position head amp differential output

■ Through holes for externally connected PSD

Pin no.	Name	Content
1	G	GND (for signal cable shield)
2	Y2	Connection to PSD anode terminal "Y2"
3	X2	Connection to PSD anode terminal "X2"
4	V_R	PSD reverse bias voltage output: connection to PSD cathode terminal
5	Y1	Connection to PSD anode terminal "Y1"
6	X1	Connection to PSD anode terminal "X1"
7	G	GND (for signal cable shield)

Accessories

· Instruction manual
· Connector HDEB-9S (Hirose Electric: for connections to power supply and output readout device)
· S5990-01/S5991-01 mounting board

Related information

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

■ Precautions
· Disclaimer

■ Technical notes
· PSD
· PSD processing circuit, PSD modules

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