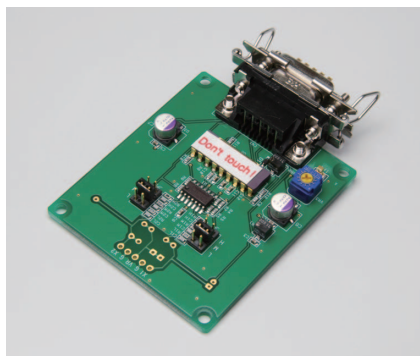


Signal processing circuit for 1-D PSD



C3683-02

Circuit board for easier 1-D PSD operation

The C3683-02 is a DC signal processing circuit for one-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 1-D PSD.
- **Output voltage directly representing the position data**
The position (mm) of a light spot from the PSD (S3931, S3932) center is obtained as an output voltage (V).
- **Accurate position sensing**
Position data of a 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 1-D PSD**
- **Performance evaluation of 1-D PSD**

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

Parameter	Symbol	Value	Unit
Supply voltage	Vcc max	±18	V
Operating temperature*1	Topr	0 to +50	°C
Storage temperature*1	Tstg	-10 to +60	°C
Input voltage	VIN max	Vcc max	V
Output short-circuit time	-	Continuous	s

*1: No dew condensation

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, Vcc=±15 V)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit		
Head amp conversion impedance		Rf	*2	H range	-	1×10^6	-	V/A	
			M range	-	1×10^5	-			
			L range	-	1×10^4	-			
Head amp feedback capacitance		Cf	*2	H range	-	10	-	pF	
			M range	-	100	-			
			L range	-	1000	-			
Input signal current		IIN	*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}			
Head amp output (V1, V2)	Rise time		Tr	*4	-	22	30	μs	
	Output voltage	High	VOH		-	0	-	V	
		Low	VOL		-	-13.8	-13.5		
	Output noise voltage		Vn	*5	-	2	-	mVp-p	
Output offset voltage		Vos	*5	-1	-	+1	mV		
Sum signal output (VA)	Rise time		Tr	*4	-	22	30	μs	
	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		
Subtracted signal output (VB)	Rise time		Tr	*4	-	22	30	μs	
	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		
Analog divider output (Vo)	Rise time		Tr	*4	-	22	30	μs	
	Maximum output amplitude voltage		Vo		Factory setup prior to shipping*6	±5.8	±6	±6.2	V
	Output noise voltage		Vn	*5	-	5	-	mVp-p	
	Output offset voltage		Vos	*5	-60	-	+60	mV	
PSD reverse bias voltage		VR		Factory setup prior to shipping*7	+4.9	+5	+5.1	V	
Supply voltage		Vcc	*8		±14.5	±15	±15.5	V	
Current consumption		Icc	*5		-	±8	-	mA	

*2: Factory setup prior to shipping is M range. The range can be switched with the jumper on the board.

*3: Photocurrent with PSD installed. 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=400 μA, M range: X1=X2=40 μA, H range: X1=X2=4 μA) is input. When maximum output amplitude voltage Vo=±6 V is set.

*6: Factory setup prior to shipping is ±6 V. Maximum output amplitude can be adjusted in a range of ±2 to ±10 V with a variable 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.

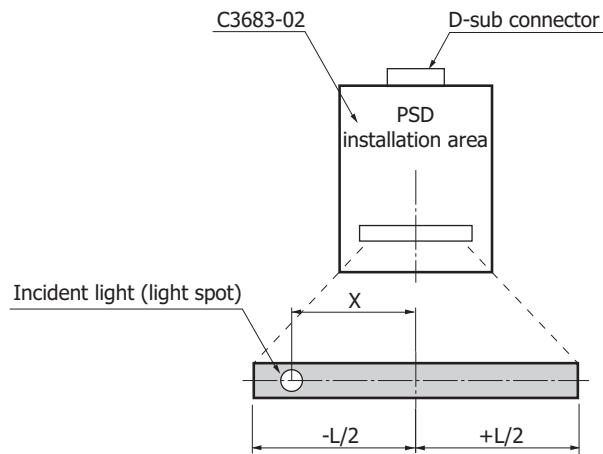
Type no.	Photosensitive area size (mm)	Position resolution* ⁹ (μm)	Package (mm)	Installation on board	External attachment* ¹⁰
S3931	6 × 1	2.5	Ceramic (9.2 × 4.8)	Yes	Yes
S3932	12 × 1	5	Ceramic (15.2 × 4.8)	Yes	Yes
S3270	37 × 1	15.4	Ceramic (55 × 5)	Yes	Yes
S8543	24 × 0.7	10	Ceramic (36.7 × 4)		Yes
S4581-04	2 × 1	0.8	Plastic		Yes
S4583-04	3 × 1	1.3	Plastic		Yes
S8673	3 × 1	1.3	Plastic		Yes
S4584 series	3.5 × 1	1.5	Plastic		Yes
S3274-05	3.5 × 1	1.5	Plastic		Yes
S7105 series	4.2 × 1	1.8	Plastic		Yes
S5629 series	6 × 1	2.5	Plastic		Yes

*9: Reference value. When maximum output amplitude voltage $V_o = \pm 6$ V is set.

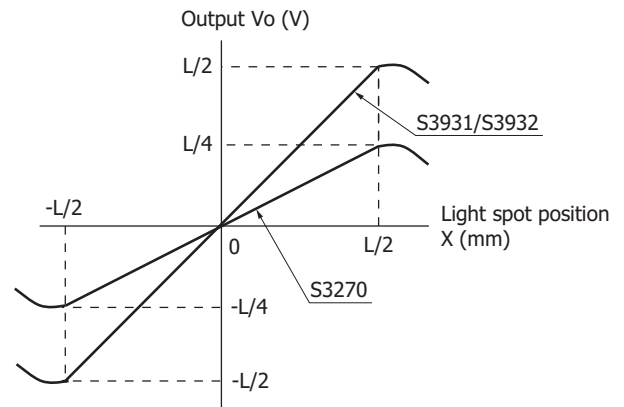
*10: Wiring using shielded wires or AWG#26 or equivalent twisted pair wires (no longer than 30 cm) is recommended.

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. 2 (V_o).



L: PSD photosensitive area length (mm)

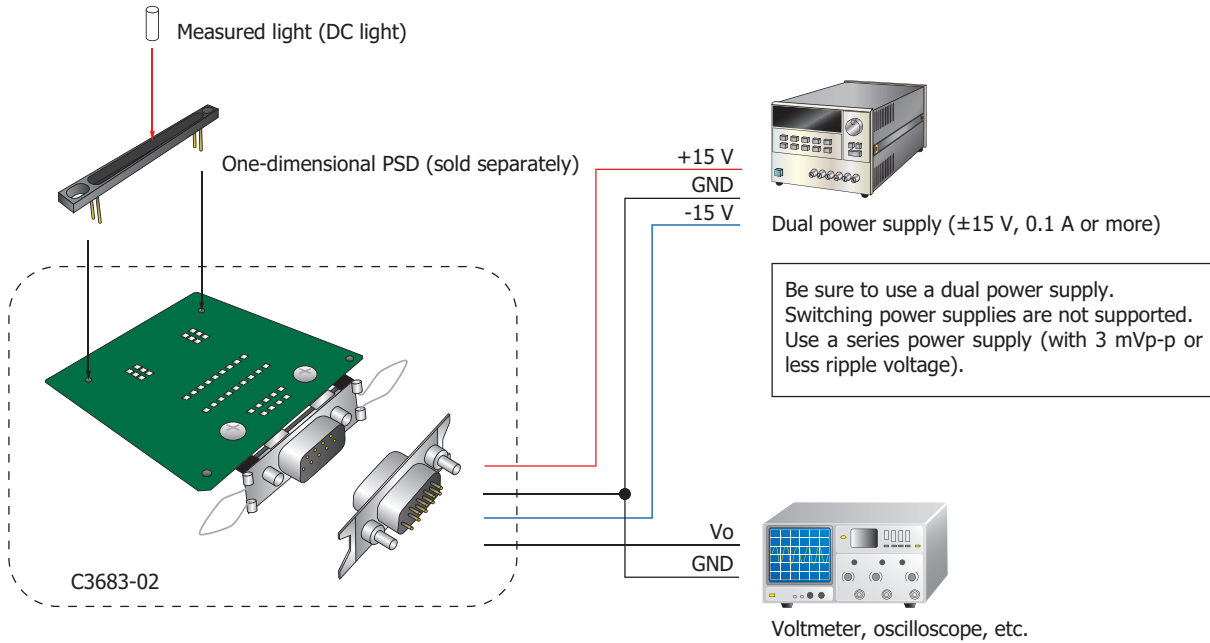


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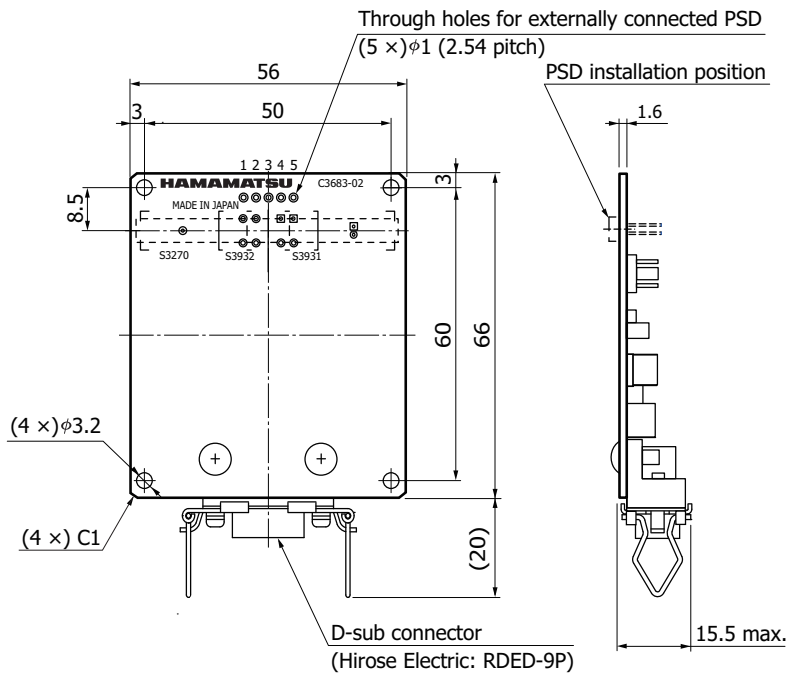
Parameter	Symbol	One-dimensional PSD			Unit
		S3931	S3932	S3270	
Photosensitive area length	L	6	12	37	mm
Output amplitude voltage	$V_o(X)$	± 3	± 6	± 9.25	V

Connection example



KACCC0653EB

Dimensional outline (unit: mm)



Tolerance: ± 0.2

KACCA0307EA

Pin connections

D-sub connector

Pin no.	Name	Content
1	V _R	PSD reverse bias voltage output
2	V ₀	Analog divider output (position signal output)
3	-V	-15 V
4	+V	+15 V
5	G	GND
6	V _B	Differential signal output
7	V ₂	Head amp output X2
8	V ₁	Head amp output X1
9	V _A	Sum signal output (incident light level monitor output)

Through holes for externally connected PSD

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

Accessories

- Instruction manual
- Connector HDEB-9S (Hirose Electric: for connections to power supply and output readout device)

Related information

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

- Precautions
- Disclaimer

Information described in this material is current as of January 2017.

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