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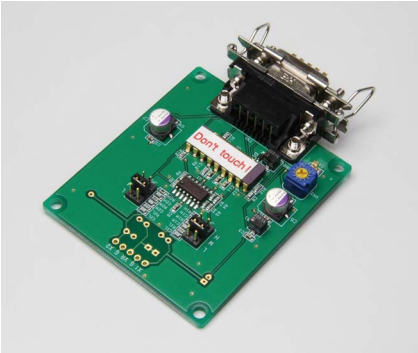
Signal processing circuit for 1-D PSD

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	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}	
Head amp output (V1, V2)	Cutoff frequency		fc	-3 dB	Lower	-	DC	-	kHz
					Upper	12	16	-	
	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)	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
Subtracted signal output (VB)	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
Position conversion signal output (Vo)	Cutoff frequency		fc	-3 dB	Lower	-	DC	-	kHz
					Upper	12	16	-	
	Maximum output amplitude voltage		Vfs	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
Reference 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		-	±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 Vfs=±6 V is set.
*6: Factory setup prior to shipping is 6 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

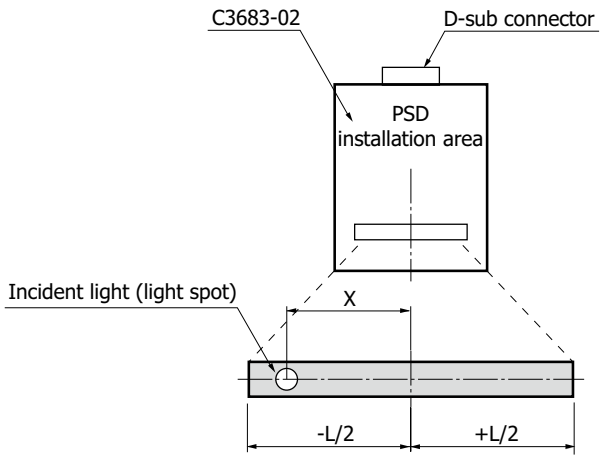
A PSD is installed (soldered) on the signal processing circuit.
Note: PSDs are sold separately.

Type no.	Photosensitive area size (mm)	Position resolution*9 (µm)	Package (mm)	Installation on board	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
S8543	24 × 0.7	10	Ceramic (36.7 × 4)		Yes
S4583-04	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
S15430-01CT/-02CT S15430-03CT	1 × 6	1.5	Glass epoxy		Yes

*9: Reference value. When maximum output amplitude voltage Vo=±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 (Vo).



L: PSD photosensitive area length (mm)

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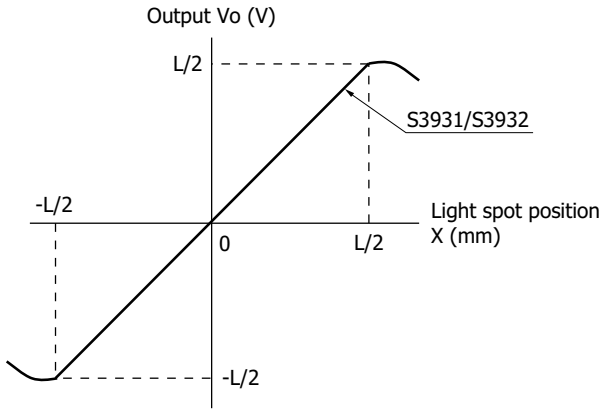

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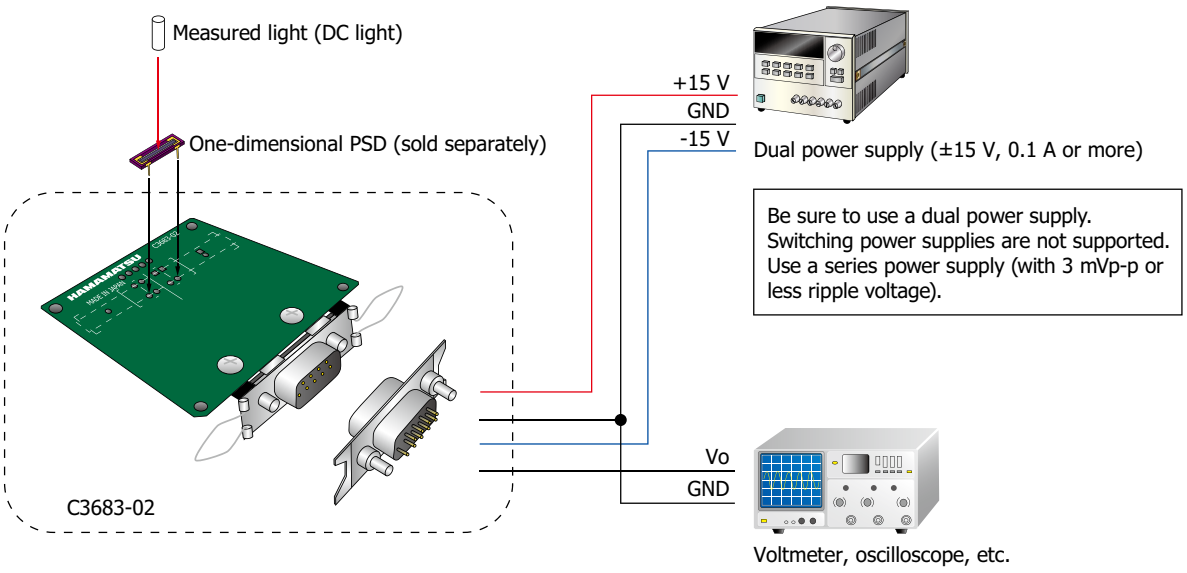
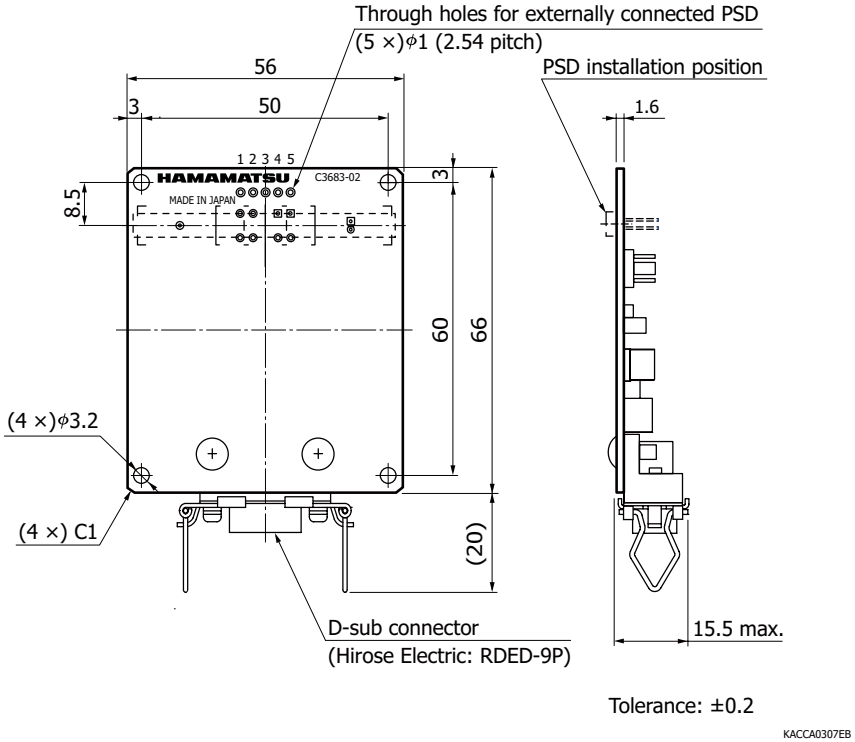
Parameter	Symbol	One-dimensional PSD		Unit
		S3931	S3932	
Photosensitive area length	L	6	12	mm
Output amplitude voltage	Vo(X)	±3	±6	V

Connection example



Dimensional outline (unit: mm)



Pin connections

■ D-sub connector

Pin no.	Name	Content
1	V_R	PSD reverse bias voltage output
2	Vo	Analog divider output (position signal output)
3	-V	-15 V
4	+V	+15 V
5	G	GND
6	VB	Differential signal output
7	V2	Head amp output X2
8	V1	Head amp output X1
9	VA	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

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

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