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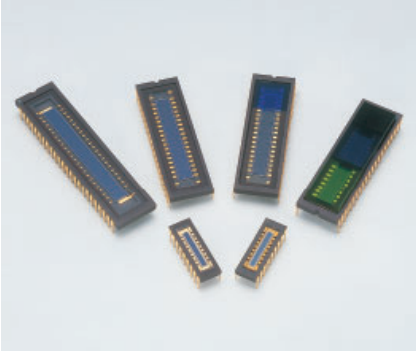
Si photodiode array



S4111/S4114 series

16, 35, 46 element Si photodiode array for UV to NIR

S4111/S4114 series are Si photodiode linear array mounted in ceramic DIPs (Dual Inline Packages). These photodiode arrays are primarily developed for low-light-level detection such as spectrophotometry, and cover a wide spectral range from UV to near infrared light. Since all elements can be used with a reverse bias for charge storage readout, S4111/S4114 series are able to detect low level light with high sensitivity. Cross-talk between elements is minimized to maintain signal purity. Special filters can be attached as the input window (custom order products).

Features

- **Large active area**
- **Low cross-talk**
- **S4111 series: Enhanced infrared sensitivity, low dark current**
- **S4114 series: IR sensitivity suppressed type, low terminal capacitance, high-speed response**

Applications

- **Multichannel spectrophotometers**
- **Color analyzers**
- **Light spectrum analyzers**
- **Light position detection**

General ratings / Absolute maximum ratings

Type No	Window material	Package (mm)	Active area (per 1 element) Size (mm)	Active area (per 1 element) Effective area (mm^2)	Between elements measure (mm)	Between elements pitch (mm)	Number of elements	Absolute maximum ratings: Reverse voltage V_R max (V)	Absolute maximum ratings: Operating temperature Topr (°C)	Absolute maximum ratings: Storage temperature Tstg (°C)
S4111-16R	Resin potting	18 pin DIP	1.45 × 0.9	1.305	0.1	1.0	16	15	-20 to +60	-20 to +80
S4111-16Q	Quartz									
S4111-35Q		40 pin DIP	4.4 × 0.9	3.96			35			
S4111-46Q		48 pin DIP					46			
S4114-35Q		40 pin DIP					35			
S4114-46Q		48 pin DIP					46			

Note: Absolute maximum ratings are the values that must not be exceeded at any time. If even one of the absolute maximum ratings is exceeded even for a moment, the product quality may be impaired. Always be sure to use the product within the absolute maximum ratings.

Electrical and optical characteristics (Typ. Ta=25 °C, per 1 element, unless otherwise noted)

Type No.	Spectral response range λ (nm)	Peak sensitivity wavelength λp (nm)	Photo sensitivity S: λp (A/W)	Photo sensitivity S: 200 nm (A/W)	Photo sensitivity S: 633 nm (A/W)	Dark current I_D Max.: V_R=10 mV (pA)	Dark current I_D Max.: V_R=10 V (pA)	Shunt resistance Rsh V_R=10 mV: Min (GΩ)	Shunt resistance Rsh V_R=10 mV: Typ. (GΩ)	Terminal capacitance Ct: V_R=0 V (pF)	Terminal capacitance Ct: V_R=10 V (pF)	Rise time tr R_L=1 kΩ λ=655 nm: V_R=0 V (μs)	Rise time tr R_L=1 kΩ λ=655 nm: V_R=10 V (μs)	NEP λ=λp: V_R=0 V ($W/Hz^{1/2}$)	NEP λ=λp: V_R=10 V ($W/Hz^{1/2}$)
S4111-16R	340 to 1100	960	0.58	-	0.39	5	25	2.0	250	200	50	0.5	0.1	4.4×10^{-16}	1.7×10^{-15}
S4111-16Q	190 to 1100			0.08	0.43										
S4111-35Q				0.08	0.43	10	50	1.0	30	550	120	1.2	0.3	1.3×10^{-15}	3.1×10^{-15}
S4111-46Q															
S4114-35Q	190 to 1000	800	0.50			60	300	0.15	2	35	20	0.1	0.05	5.7×10^{-15}	8.0×10^{-15}
S4114-46Q															

Spectral response

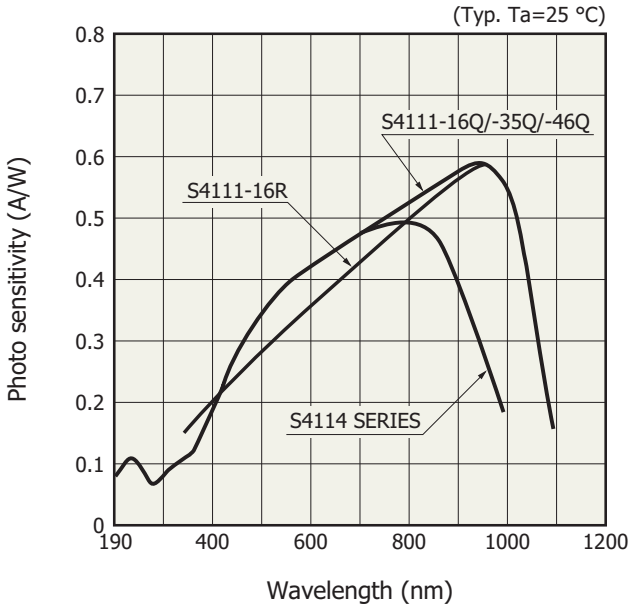


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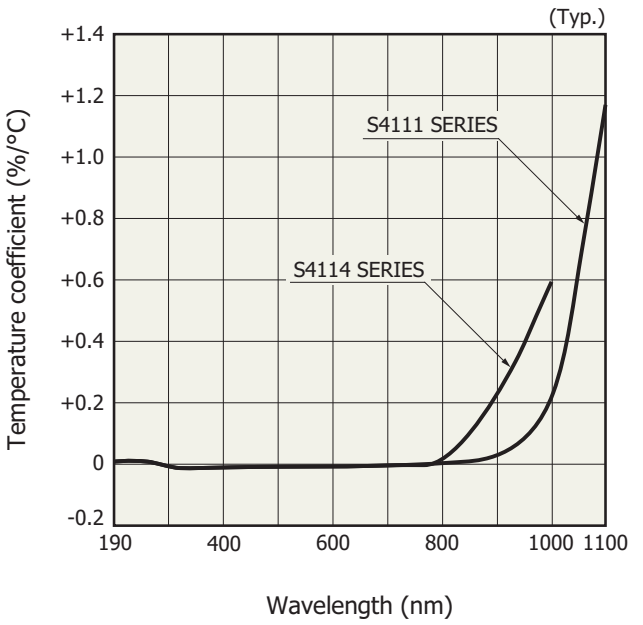
Photo sensitivity temperature characteristics



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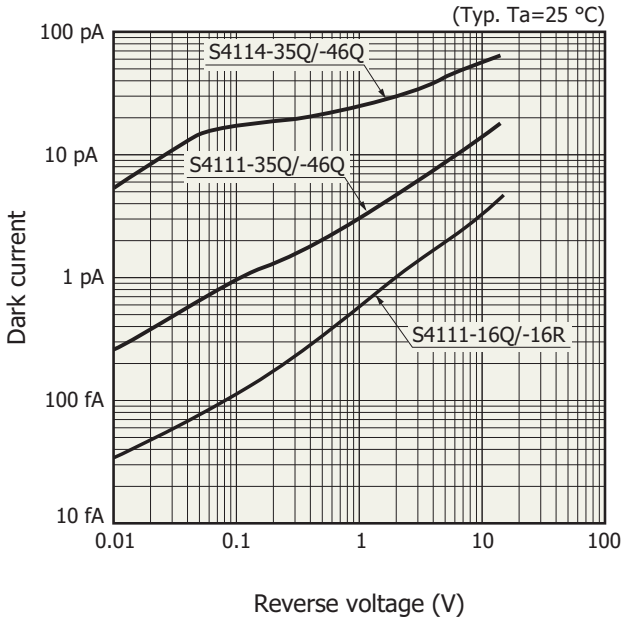
Dark current vs. reverse voltage



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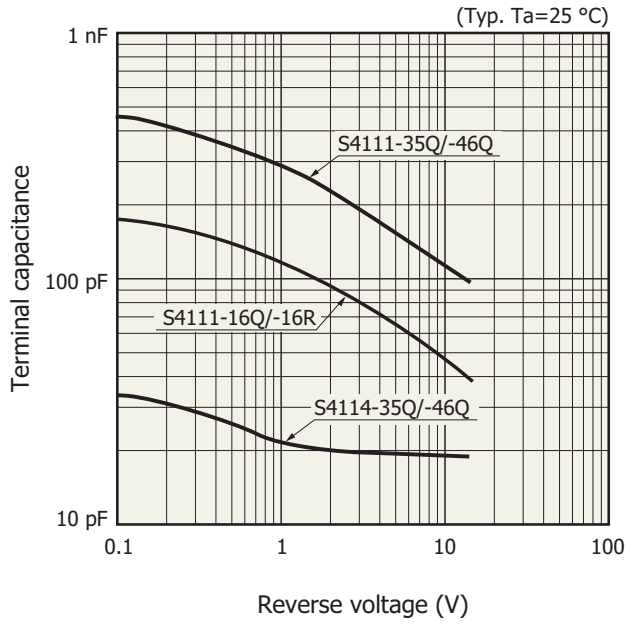
Terminal capacitance vs. reverse voltage



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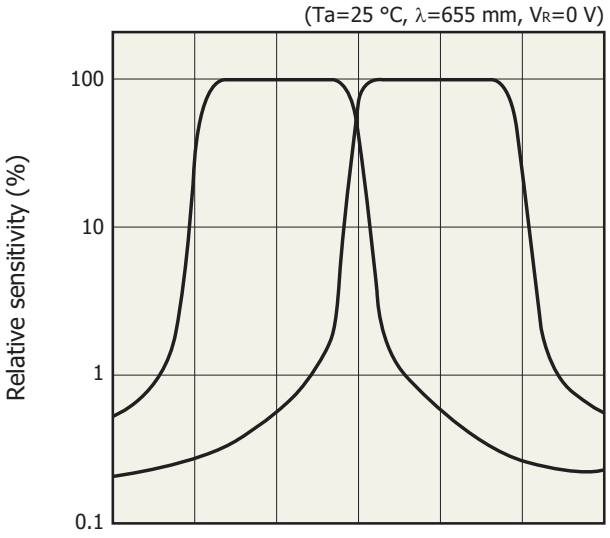
Example of cross-talk

S4111 series



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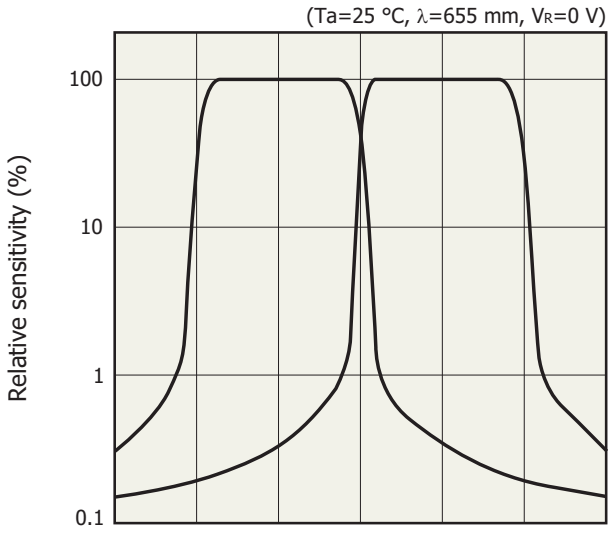
S4114 series



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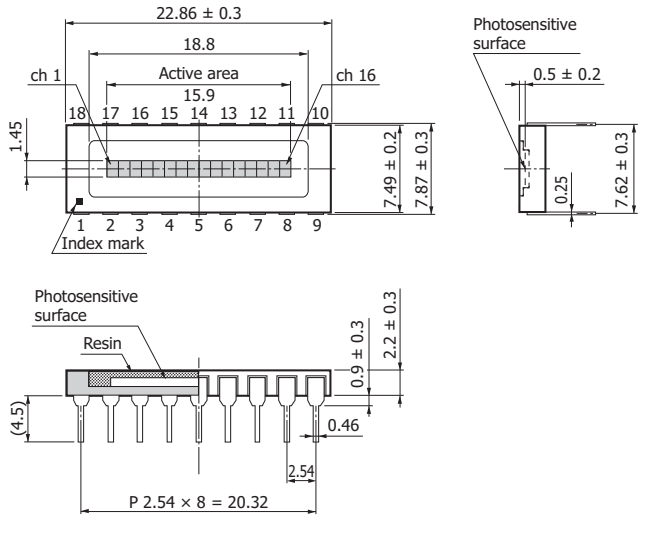
Dimensional outline (unit: mm)

S4111-16R



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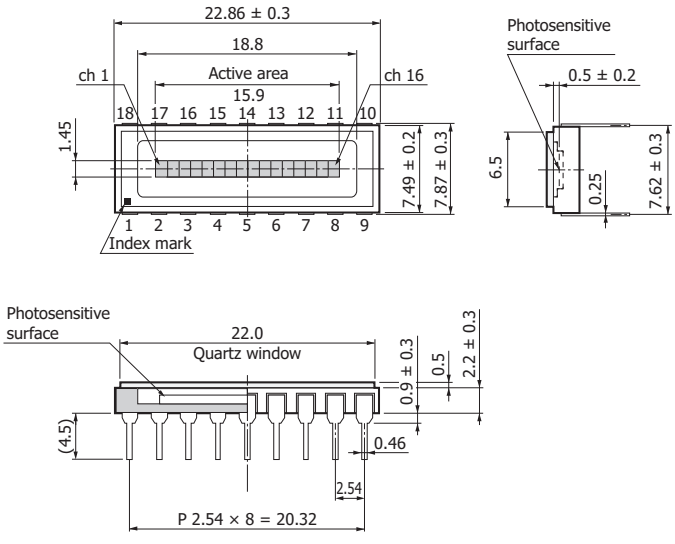
S4111-16Q



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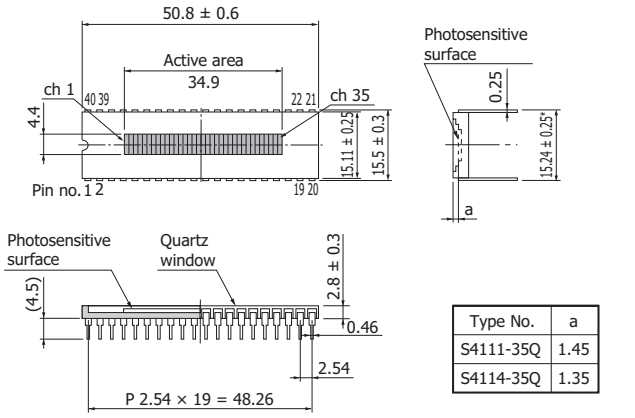
S4111-35Q, S4114-35Q



Type No.	a
S4111-35Q	1.45
S4114-35Q	1.35

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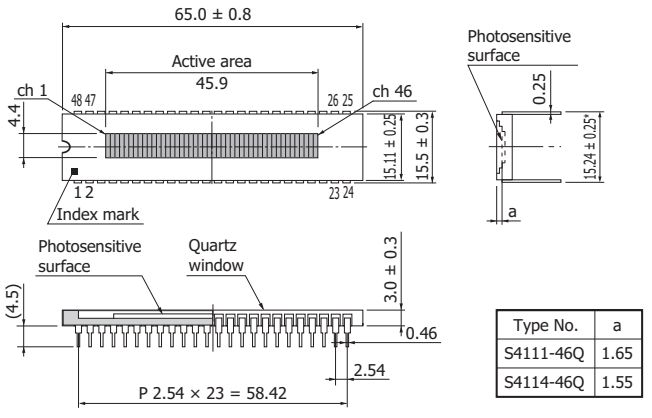
S4111-46Q, S4114-46Q



Type No.	a
S4111-46Q	1.65
S4114-46Q	1.55

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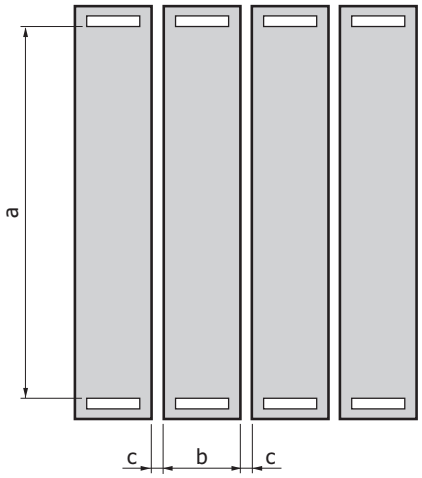
Details of elements (for all types)



	a	b	c
S4111-16Q/16R	1.45	0.9	0.1
S4111-35Q/46Q S4114-35Q/46Q	4.4	0.9	0.1

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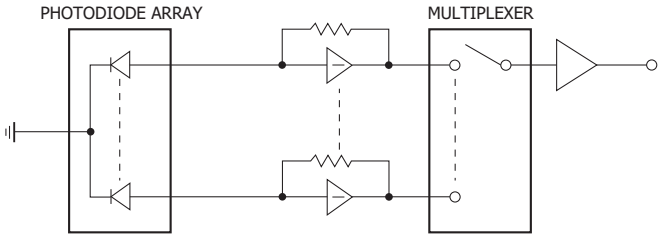
Pin connections

Pin No.	16-element type	35-element type	46-element type
1	KC	KC	KC
2	2	2	2
3	4	4	4
4	6	6	6
5	8	8	8
6	10	10	10
7	12	12	12
8	14	14	14
9	16	16	16
10	KC	18	18
11	15	NC	20
12	13	20	22
13	11	22	24
14	9	24	26
15	7	26	28
16	5	28	30
17	3	30	32
18	1	32	34
19		34	36
20		NC	38
21		KC	40
22		35	42
23		33	44
24		31	46
25		29	KC
26		27	45
27		25	43
28		23	41
29		21	39
30		19	37
31		17	35
32		15	33
33		13	31
34		11	29
35		9	27
36		7	25
37		5	23
38		3	21
39		1	19
40		NC	17
41			15
42			13
43			11
44			9
45			7
46			5
47			3
48			1

Operating circuits

① In the most generally used circuit, operational amplifiers are con-nected to each channel to read the output in real time. The output of an operational amplifier is of low impedance and thus can be easily multiplexed.



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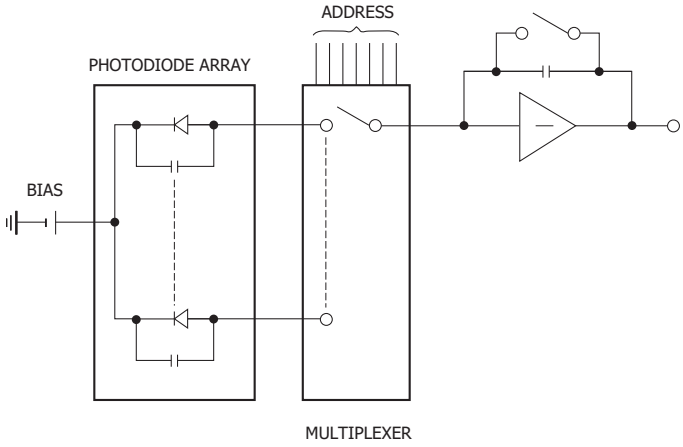
② In the charge storage readout method, the charge stored in the junction capacitance of each channel, which is proportional to the incident light intensity, can be read out in sequence by a multiplexer. With this method, reverse voltage must be applied to the photodiodes, so S4111 and S4114 series are suitable. One amplifier is sufficient but care should be taken regarding noise, dynamic range, etc.



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HAMAMATSU also provides the C9004 driver circuit for Si photodiode arrays, that allows direct mounting of the S4111-16Q/R on the circuit board.

Information described in this material is current as of October, 2011.

Product specifications are subject to change without prior notice due to improvements or other reasons. Before assembly into final products, please contact us for the delivery specification sheet to check the latest information.

Type numbers of products listed in the delivery specification sheets or supplied as samples may have a suffix "(X)" which means preliminary specifications or a suffix "(Z)" which means developmental specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.

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