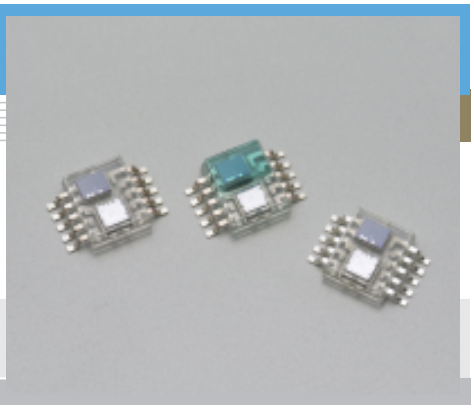
Photo IC for photometry
S6446 series, S6975

Photo IC incorporating a dual-element photodiode and log amp



S6446 series and S6975 are designed for camera exposure meters. These photo ICs consist of a dual-element (ball-in-box) photodiode and an IC integrating a logarithmic amplifier circuit and a thermosensor, etc.

Features

- Photometry in central and peripheral areas
- Clear miniature plastic package (4.5 × 5.5 mm)
- Low noise
- Built-in thermosensor
- S6446-20: With visual-compensation filter
- S6975: Large photometric output change
  (Logarithmic amplifier gain is 1.5 times larger than S6446.)

Applications

- Camera auto exposure meter
- Various photometric applications

■ Absolute maximum ratings (Ta=25 °C)

Parameter		Symbol	Value	Unit
Supply voltage		Vcc	-0.3 to +7	V
Input voltage	POC terminals	Vin	-0.3 to Vcc+0.3	V
	Other terminals		Do not input voltage	-
Operating temperature		Topr	-20 to +60	°C
Storage temperature		Tstg	-30 to +80	°C
Soldering		-	230 °C, 3 s	-

■ Recommended operating conditions

Parameter	Symbol	S6446/-20	S6975	Unit
Supply voltage	Vcc	3.0 to 3.5	4.5 to 5.5	V
		4.5 to 5.5		
Operating temperature	Topr	-15 to +40		°C

■ Optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition			Min.	Typ.	Max.	Unit
Spectral response range	λ				-	320 to 1100	-	nm
		*1			-	320 to 730	-	
Peak sensitivity wavelength	λp				-	960	-	nm
		*1			-	560	-	
Short circuit current	Isc	100 lx, "A" light source	Center		-	250	-	nA
			Peripheral		-	2.5	-	μA
			*1	Center	-	22	-	nA
				Peripheral	-	220	-	nA

■ Temperature characteristics *2 (Ta= -15 to +40 °C, based on a value at 25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Terminal
Terminal voltage change	ΔVrf4		-30	-	30	mV	VR⑥
Output voltage temperature coefficient	α		-	17.8	-	mV/°C	TO④
Output voltage temperature coefficient	β	Output voltage S6446/-20: 500 mV, S6975: 780 mV	-	2500	-	ppm/°C	PO⑧
		Output voltage S6446/-20: 1000 mV, S6975: 1550 mV	-	2900	-		
		Output voltage S6446/-20: 1500 mV, S6975: 2300 mV	-	3000	-		
		Output voltage S6446/-20: 2000 mV, S6975: 3100 mV	-	3100	-		

*1: When used with a standard visual compensation filter (0.5 mm thick)
*2: S6446/-20: Vcc=3.2 V, S6975: Vcc=5.0 V

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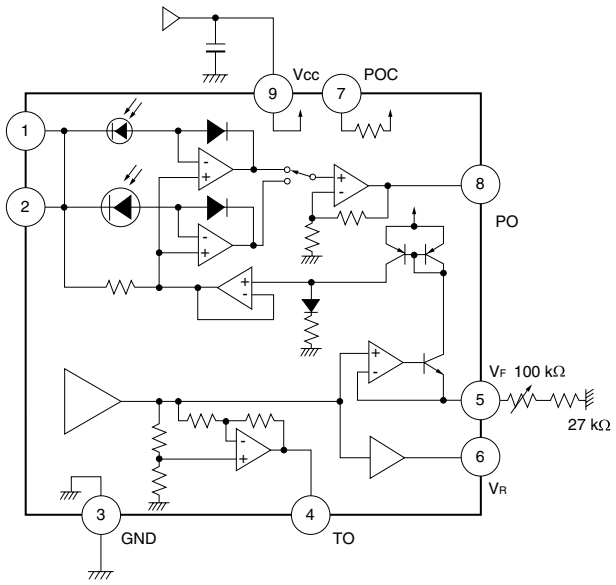
■ Electrical and optical characteristics *3 (Ta=25 °C)

Parameter	Symbol	Condition	S6446/-20 Min.	S6446/-20 Typ.	S6446/-20 Max.	S6975 Min.	S6975 Typ.	S6975 Max.	Unit	Terminal
Current consumption	Icc	Vcc=6.5 V, 100 lx, "A" light source *4	-	3.5	6.0	-	3.5	6.0	mA	Vcc⑨
H Input voltage	VIH		Vcc × 0.7	-	-	Vcc × 0.7	-	-	V	POC⑦ Output switching
L Input voltage	VIL		-	-	Vcc × 0.3	-	-	Vcc × 0.3	V	POC⑦ Output switching
L Input current	IIL	VIN=0 V	-220	-110	-52	-333	-167	-83	µA	POC⑦ Output switching
Terminal voltage	Vrf		2.05	2.20	2.35	3.25	3.5	3.75	V	VR⑥ Reference voltage
Load regulation	ΔVrf	Load current 0 to 2 mA (with respect to 0.5 mA)	-12	-	12	-12	-	12	mV	VR⑥ Reference voltage
Output voltage	VTO		1.2	-	1.68	1.2	-	1.68	V	TO④ Thermo-sensor
Load regulation	ΔVTO	RL=100 kΩ (with respect to no load)	-10	-	10	-10	-	10	mV	TO④ Thermo-sensor
Output voltage 1	VPOS	100 lx, "A" light source, VF terminal ⑤ resistance 47 kΩ, *4 / POC terminal ⑦ open	1229	1369	1509	1912	2130	2348	mV	PO⑧ Photometric output
	VPOA	100 lx, "A" light source, VF terminal ⑤ resistance 47 kΩ, *4 / POC terminal GND	963	1103	1243	1498	1715	1933	mV	PO⑧ Photometric output
Output voltage 1 switching response	ts	Time required to reach within specified VPOA value after open POC terminal is set to GND level	-	-	5	-	-	5	ms	PO⑧ Photometric output
Output voltage 1 load regulation	ΔVPO1	RL=100 kΩ (with respect to no load)	-10	-	10	-10	-	10	mV	PO⑧ Photometric output
Output voltage 1 change	ΔVPO2	VF terminal resistance 27 kΩ	140	170	270	218	265	420	mV	PO⑧ Photometric output
	ΔVPO3	VF terminal resistance 100 kΩ	-270	-170	-140	-420	-265	-218	mV	PO⑧ Photometric output
Output change 1	ΔVPO4	Difference between output voltage at 1 lx and output voltage 1, *4	521	545	569	791	828	865	mV	PO⑧ Photometric output
Output change 2	ΔVPO5	Difference between output voltage at 0.1 lx and output voltage 1, *4 / POC terminal ⑦ open	769	817	865	1167	1242	1317	mV	PO⑧ Photometric output
	ΔVPO5	Difference between output voltage at 0.1 lx and output voltage 1, *4 / POC terminal ⑦ GND	793	817	841	1205	1242	1279	mV	PO⑧ Photometric output
Power supply response	tp	Time required to reach within specified ΔVPO5 value after power is turned on	-	-	80	-	-	80	ms	PO⑧ Photometric output

*3: S6446/-20: Vcc=3.2 V, S6975: Vcc=5.0 V
*4: When used with a standard visual compensation filter (0.5 mm thick)

■ Equivalent circuit



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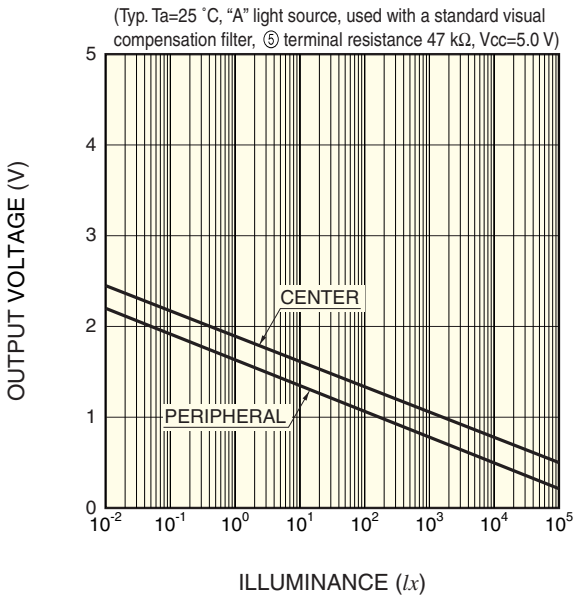
■ Photometric output vs. illuminance

S6446 series



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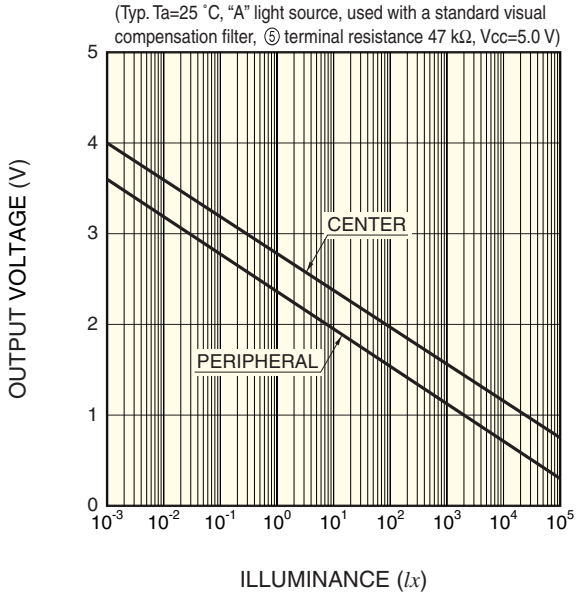
S6975



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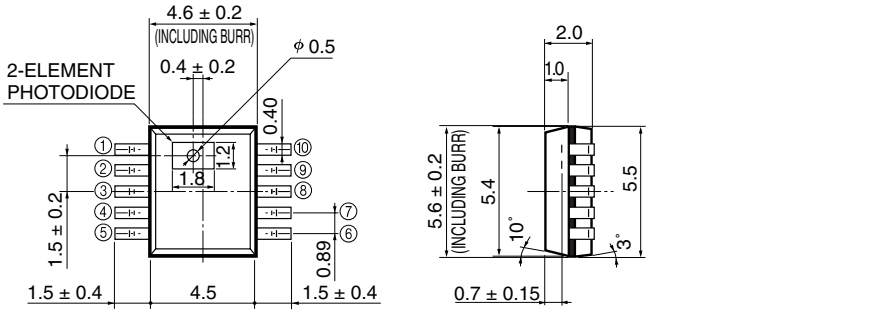
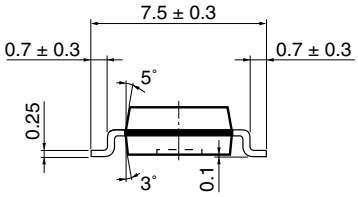
■ Dimensional outlines (unit: mm)

S6446, S6975





① CATHODE
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③ GND
④ TO (THERMOSENSOR)
⑤ VF (PHOTOMETRIC OUTPUT ADJUSTMENT)
⑥ VR (REF VOLTAGE OUTPUT)
⑦ POC (SELECTS CENTRAL ELEMENT WHEN "H" OR OPEN)
⑧ PO (PHOTOMETRIC OUTPUT)
⑨ Vcc
⑩ NC

Tolerance unless otherwise noted: ±0.1, ±2°
Shaded area indicates burr.

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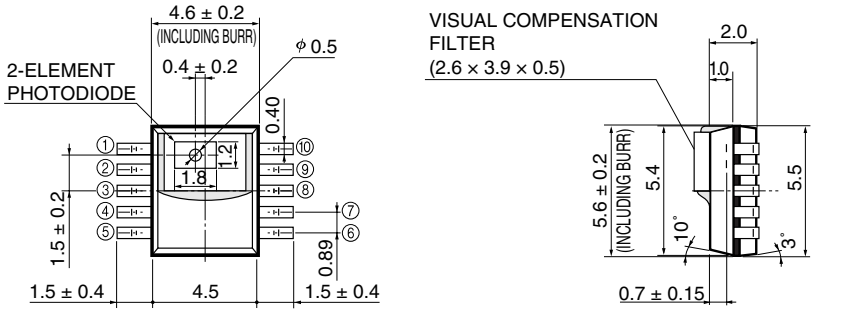
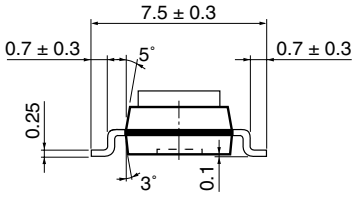
S6446-20





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