

S9705

Converts light level to frequency of output pulse

The S9705 is a photo IC that combines a photodiode and a current-to-frequency converter on a CMOS chip. Output is a square wave (50% duty ratio) with frequency directly proportional to light level incident on the photodiode. The CMOS level digital output allows direct connection to a microcontroller or other logic circuitry. The S9705 has wide dynamic range and light level can be easily measured when used with a digital counter.

Features

- Converts light level to frequency
- Wide dynamic range: 5 orders of magnitude
- Excellent linearity
- Output timing reset function
- Digital output for direct interface to microcontroller
- 4-pin plastic package

Applications

- Liquid crystal monitor backlight dimmer for mobile devices
- Brightness adjustment for large-screen liquid crystal TV
- Lighting dimmer
- Replacement for CdS photoconductive cells

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vdd	Ta=25 °C	-0.3 to +6	V
Load current	Io	Ta=25 °C	±2	mA
Power dissipation	P	Ta=25 °C	50	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-40 to +100	°C
Reflow soldering conditions*1	Tsol		Peak temperature 250 °C max., 2 times (see page 5)	-

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.

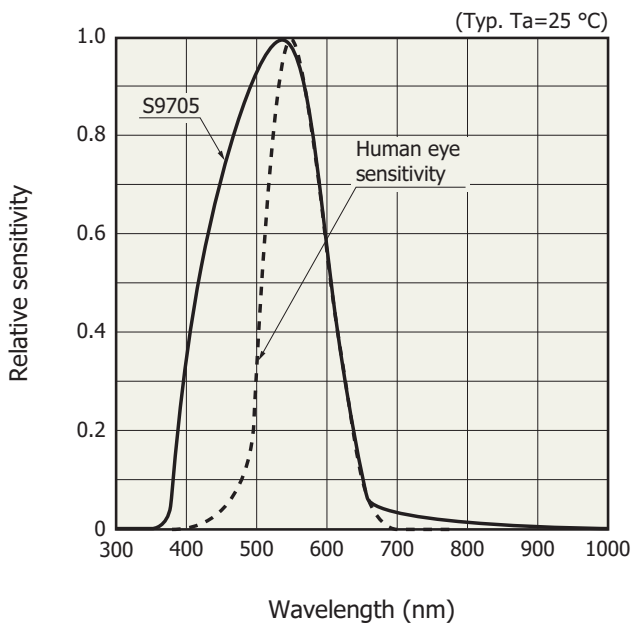
*1: JEDEC level 4

Electrical and optical characteristics (RESET="L", Vdd=5 V, Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	λ_p		-	550	-	nm
Supply voltage	Vdd		2.7	-	5.5	V
Current consumption	Idd	Dark state, no load	-	1.5	3.0	mA
Output frequency	fo	2856 K, 100 lx	38	50	62	kHz
Maximum output frequency	fmax	10 klx, DC light source	300	-	1000	kHz
Response time	tfl	5 lx to 5 mlx, 90%	-	-	0.1	s
Dark frequency	fd		0	-	2	Hz
Linearity	-	fo=10 kHz*2	-3	-	+3	%
Power supply voltage dependence of output frequency	-	Vdd=5 V ± 10%	-	±0.5	-	%/V
Temperature coefficient of output frequency	-	Ta=25 ± 10 °C, fo=10 kHz $\lambda = \lambda_p$	-	±0.02	-	%/°C
Delay time	td		-	-	0.1	µs
High level output voltage	Voh	Ioh=-0.5 mA	4.5	-	-	V
Low level output voltage	Vol	Iol=0.5 mA	-	-	0.5	V
Output impedance	Ro	RESET="H"	1	-	-	MΩ
High level input voltage	Vih	RESET	4.0	-	-	V
Low level input voltage	Vil	RESET	-	-	1.0	V
Input pull-up resistance	Rin	RESET="L"	0.1	1	5	MΩ
Output pulse duty ratio	D	fo=10 Hz	40	50	60	%

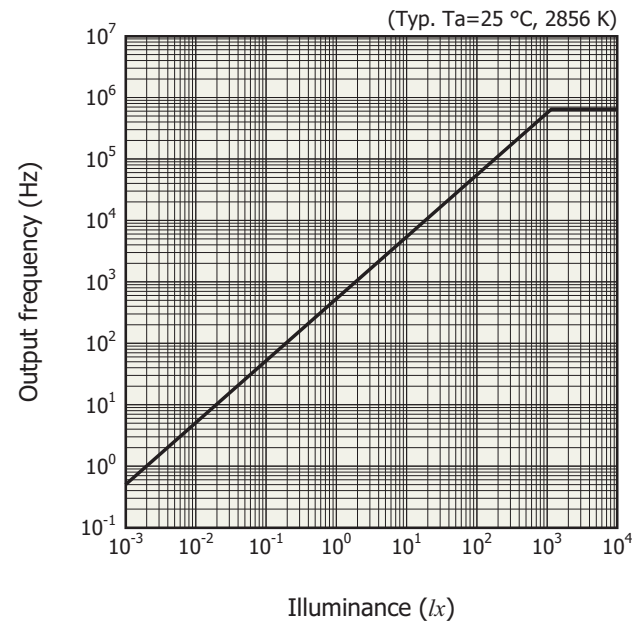
*2: Deviation from the straight line connecting the origin point to the fmax point, normalized by the 10 kHz value.

Spectral response



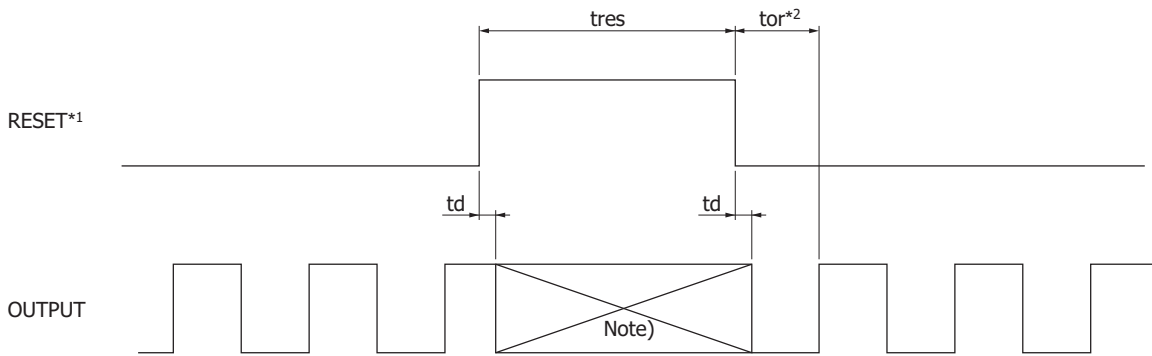
KPICB0093EB

Output frequency vs. illuminance



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Timming chart

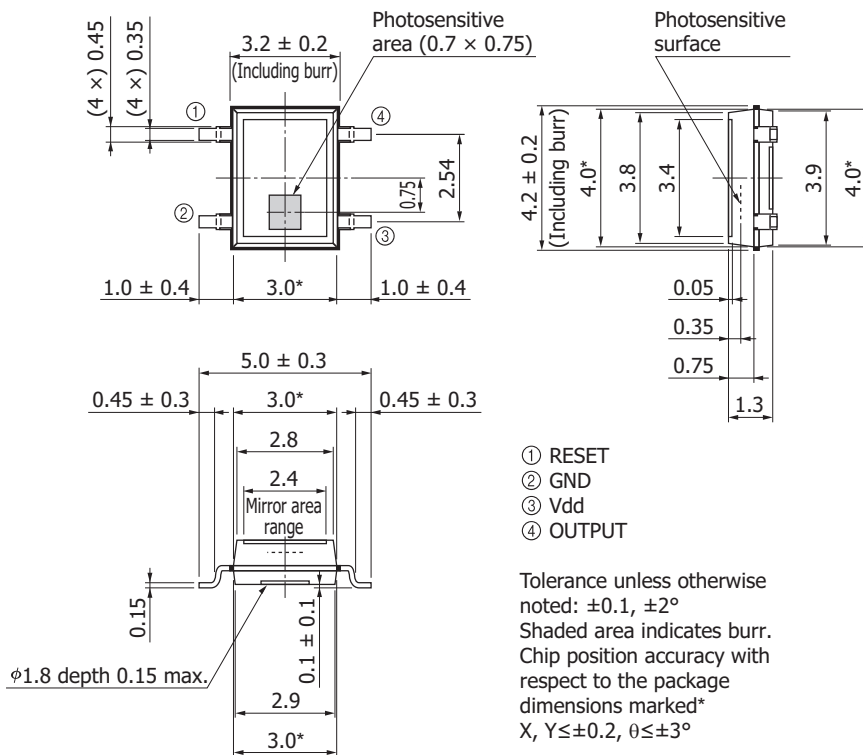


*1: OUTPUT terminal is at High impedance during RESET period ("High" state).

*2: Output starts with "Low" after releasing RESET. Illuminance can be obtained by measuring the time (tor) required before the first output transition after releasing RESET. (tres is recommended to be longer than 1 μs.)

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Dimensional outline (unit: mm)

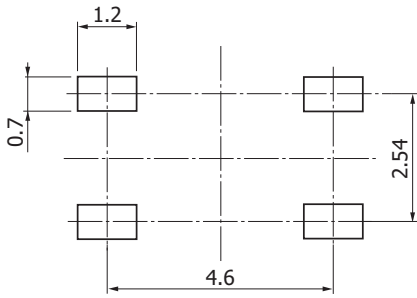


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Pin connections

Pin no.	Symbol	Function	Input/Output
1	RESET	Out disable	Input (digital)
2	GND	Ground	-
3	Vdd	Supply terminal	-
4	OUTPUT	Output terminal	Output (digital)

Recommended land pattern (unit: mm)



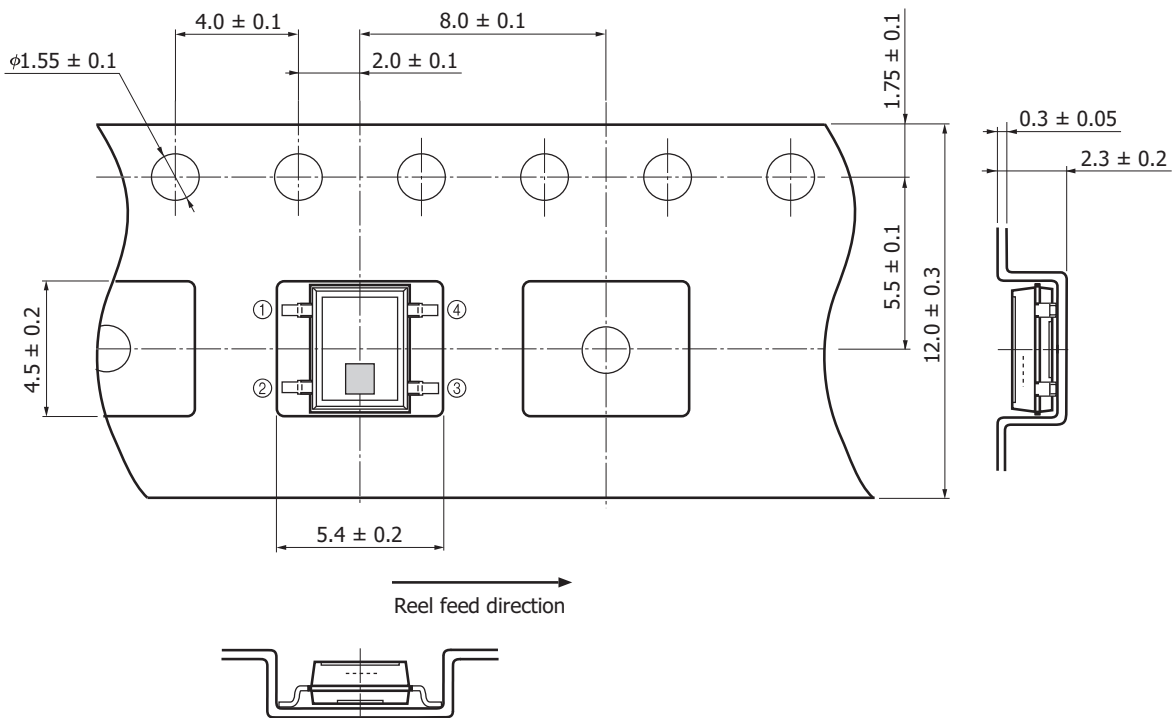
KPIC00191EA

Standard packing specifications

Reel (conforms to JEITA ET-7200)

Dimensions	Hub diameter	Tape width	Material	Electrostatic characteristics
254 mm	80 mm	12 mm	PS	Conductive

Embossed tape (unit: mm, material: PS, conductive)

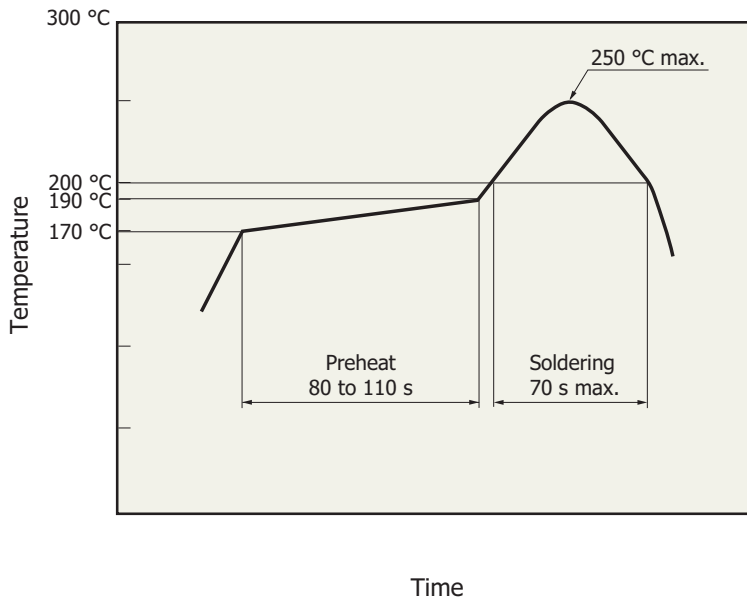


KPINC0195EA

Packing quantity
2000 pcs/reel

Packing type
Reel and desiccant in moisture-proof packaging (vacuum-sealed)

Measured example of temperature profile with our hot-air reflow oven for product testing



KPICB0173EA

- This product supports lead-free soldering. After unpacking, store it in an environment at a temperature of 30 °C or less and a humidity of 60% or less, and perform soldering within 72 hours.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. Before actual reflow soldering, check for any problems by testing out the reflow soldering methods in advance.

Related information

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

■ Precautions

- Disclaimer
- Surface mount type products

Information described in this material is current as of August, 2015.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

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