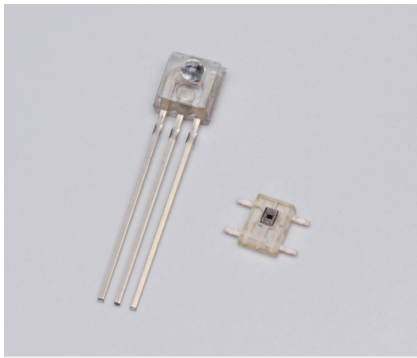


# Low-voltage operation photo IC



S7610-10 S12558-01DT

## High reliability photo IC operable at 2.2 V

The S7610-10 and S12558-01DT are photo ICs comprised of a photodiode, amplifier, schmitt trigger circuit and output transistor, all integrated onto a single chip and molded with clear resin into a miniature package. An optical encoder resistant to tough environmental conditions can be configured by combining the S7610-10 or S12558-01DT with infrared LED L6895-10 (made by Hamamatsu).

### Features

- Low voltage operation (2.2 V)
- Open collector output
- "L" level output at light input

### Applications

- Rotary encoders, etc.

### Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	S7610-10	S12558-01DT	Unit
Supply voltage	Vcc	-0.5 to +7		V
Output voltage	Vo	-0.5 to +7		V
Low level output current	Io	8		mA
Power dissipation*1	P	250		mW
Operating temperature	Topr	-30 to +85	-25 to +80	°C
Storage temperature	Tstg	-40 to +90	-30 to +85	°C

\*1: Power dissipation decreases at a rate of 3.3 mW/°C above Ta=25 °C .

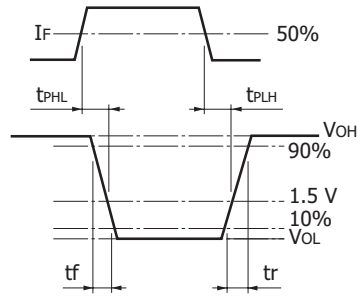
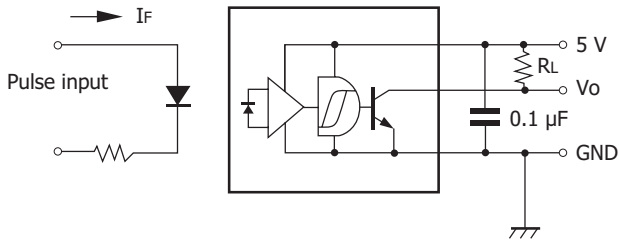
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### Electrical and optical characteristics (Ta=25 °C, Vcc=5 V, unless otherwise noted, light source: λp=890 nm LED)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Vcc		2.2	-	7.0	V
Low level output voltage	VoL	IoL=4 mA, E=0.4 μW/mm <sup>2</sup>	-	0.05	0.4	V
High level output current	IoH	E=0 μW/mm <sup>2</sup> , Vo=5 V	-	-	10	μA
Current consumption	Icc		-	1.3	3	mA
H→L threshold illuminance	EHL	RL=1.2 kΩ	-	0.10	0.25	μW/mm <sup>2</sup>
			-	1.0	2.0	
Hysteresis	Hys	ELH/EHL	0.75	0.85	0.95	-
L→H propagation delay time	tPLH	E0=0 μW/mm <sup>2</sup> E1=0.4 μW/mm <sup>2</sup>	-	4	15	μs
H→L propagation delay time	tPHL	RL=1.2 kΩ CL=10 pF*2	-	1.5	10	μs
Peak sensitivity wavelength	λp		-	850	-	nm
Rise time	tr	E0=0 μW/mm <sup>2</sup> E1=0.4 μW/mm <sup>2</sup>	-	0.07	1	μs
Fall time	tf	RL=1.2 kΩ CL=10 pF*2	-	0.03	1	μs

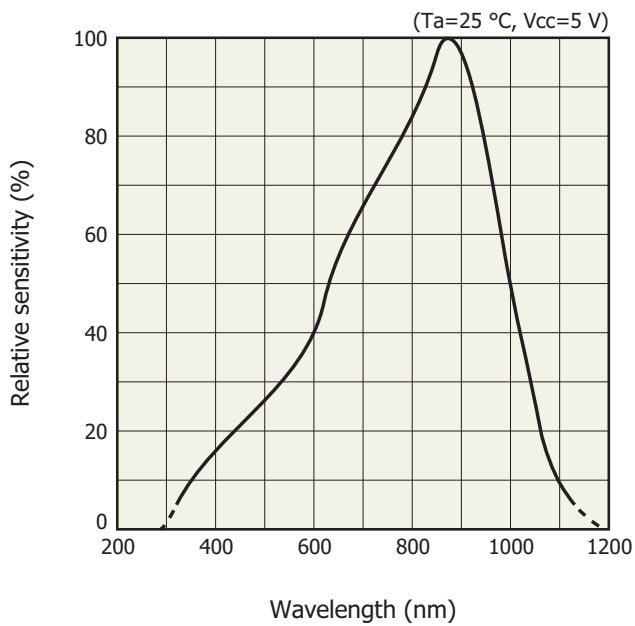
\*2: CL includes probe capacitance.

**Response time measurement circuit**



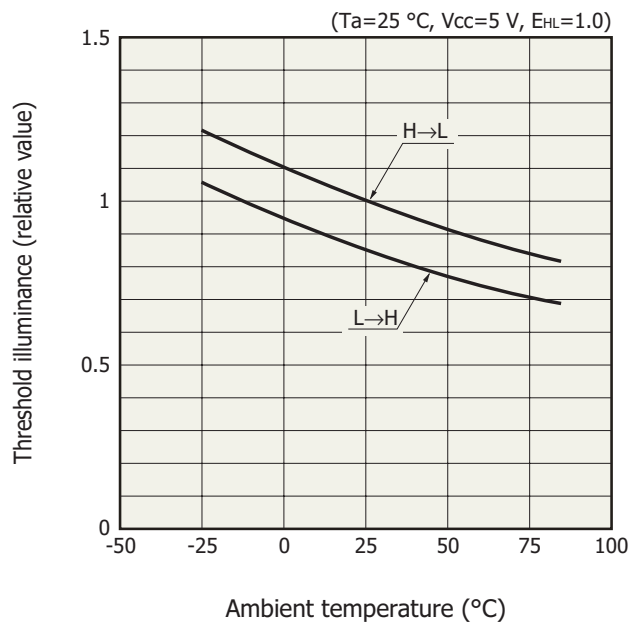
KPIC0038EB

**Spectral response (typical example)**



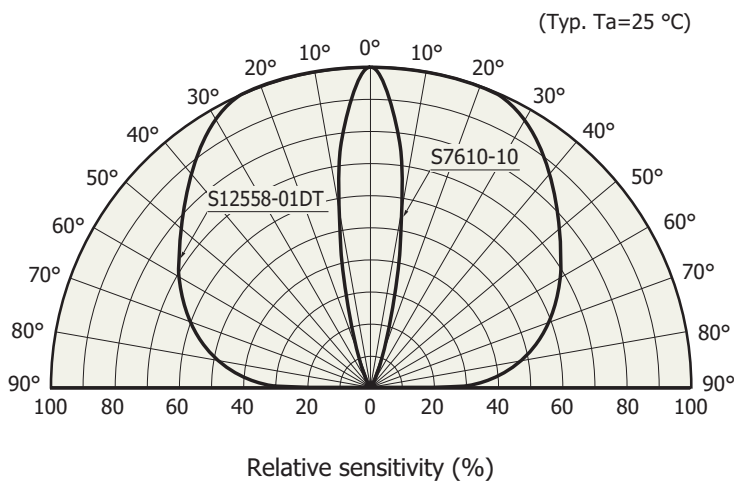
KPICB0181EB

**Threshold illuminance vs. ambient temperature (S12558-01DT, typical example)**



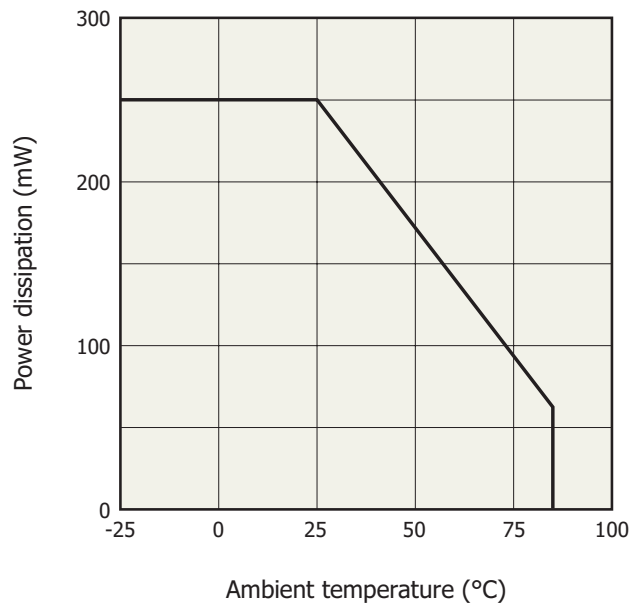
KPICB0029EB

**Directivity**



KPICB0182EB

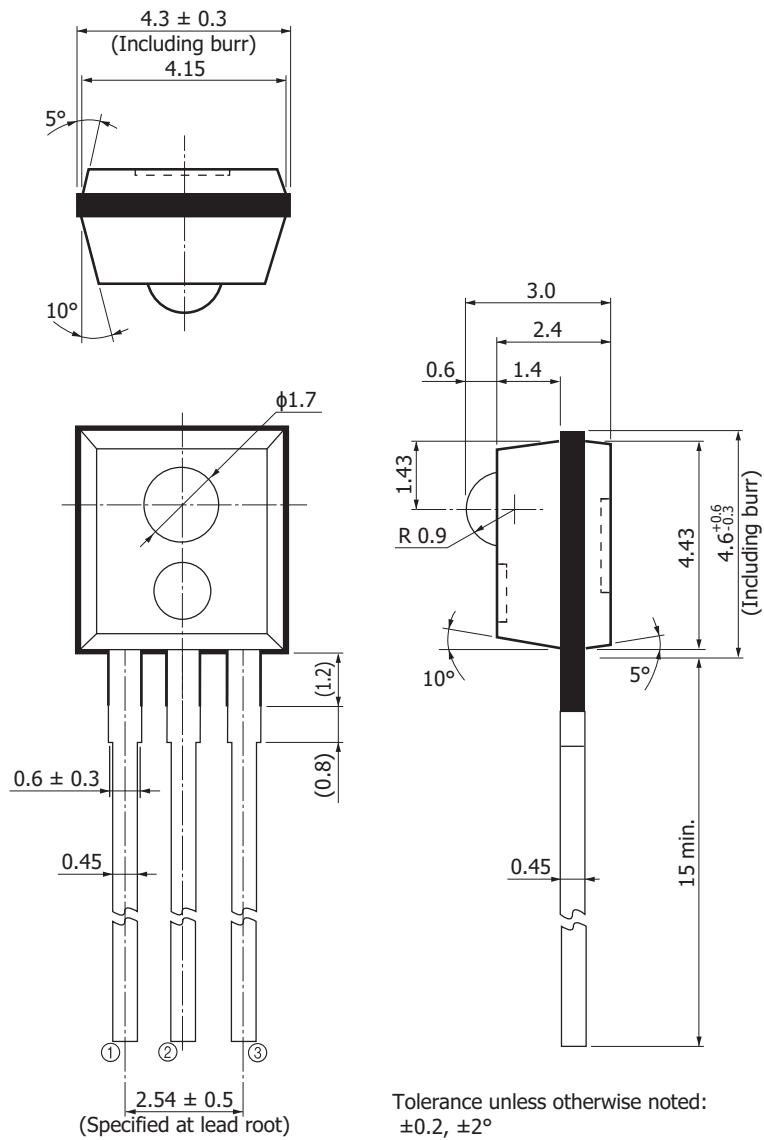
**Power dissipation vs. ambient temperature (typical example)**



KPICB0049EA

**Dimensional outlines (unit: mm)**

S7610-10

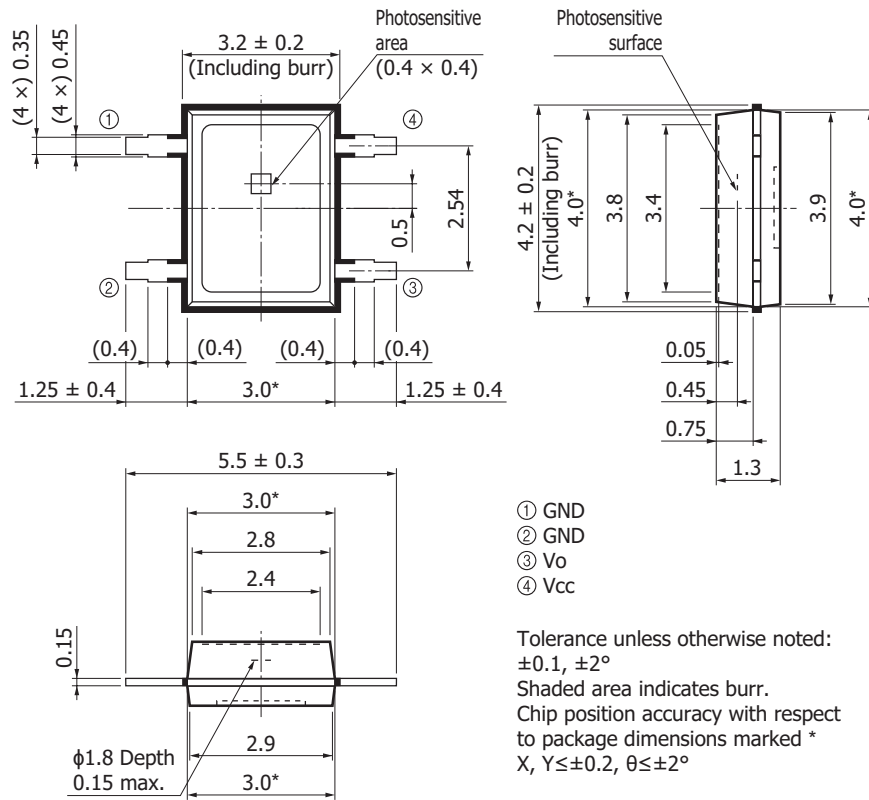


- ① GND
- ② Vo
- ③ Vcc

Tolerance unless otherwise noted:  
 $\pm 0.2, \pm 2^\circ$   
 Shaded area indicates burr.  
 Values in parentheses are reference values.

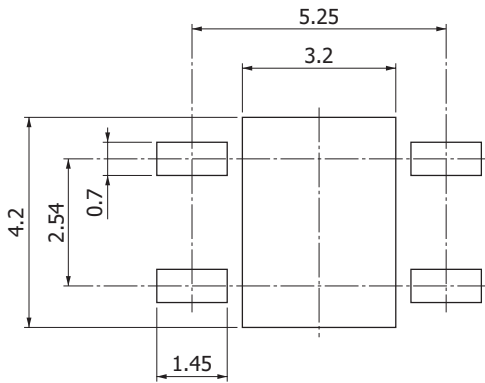
KPICA0044EC

S12558-01DT



KPICA0093EA

Recommended land patterns (unit: mm, S12558-01DT)



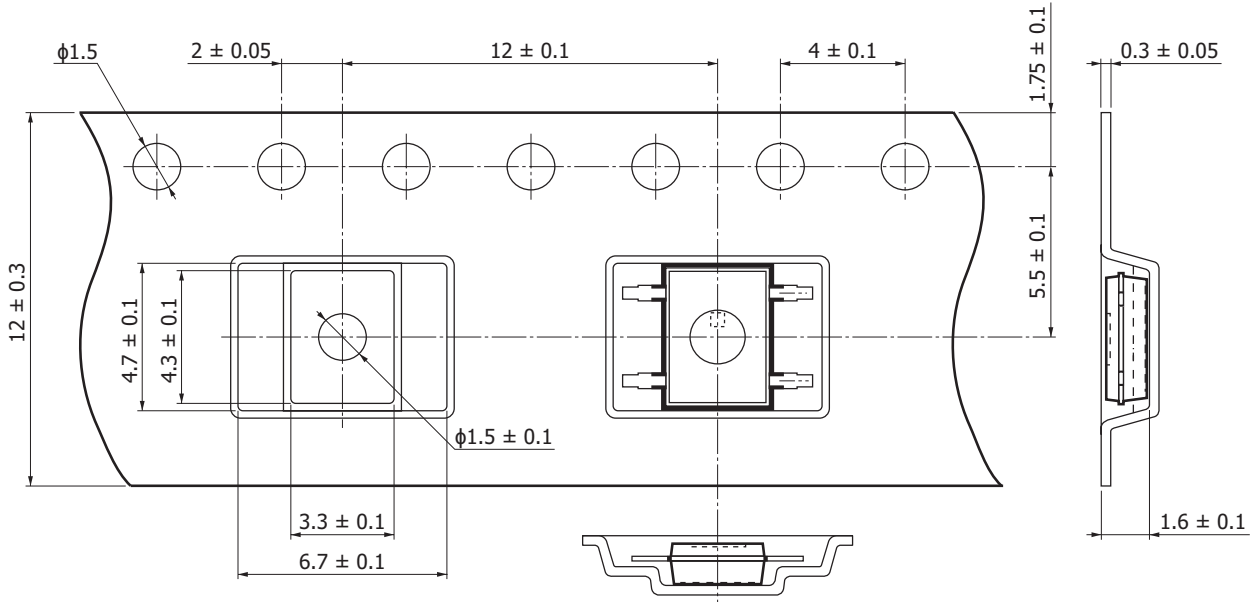
KPIC0239EA

Standard packing specifications

- Reel (conforms to JEITA ET-7200)

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

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



KPIC0240EB

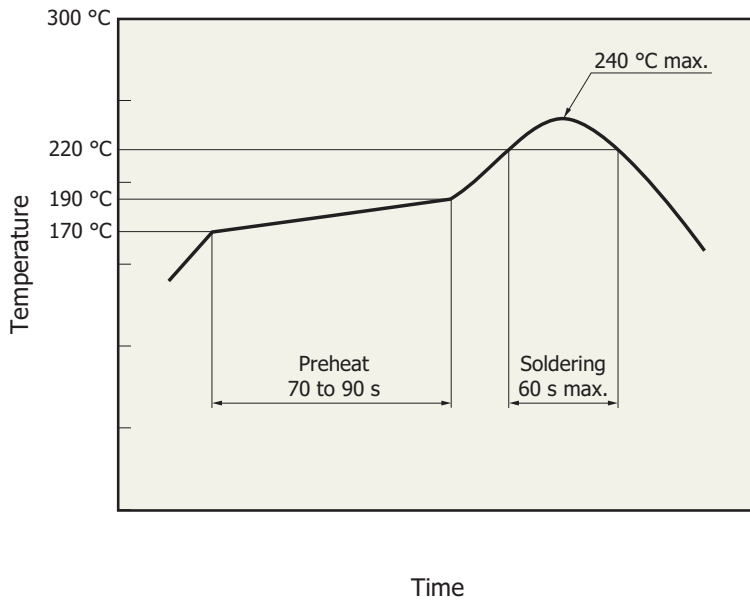
- Packing quantity

1500 pcs/reel

- Packing type

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

Example of temperature profile measured with hot-air reflow oven for our product testing (S12558-01DT)



KPICB0194EA

- The S12558-01DT 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 24 hours.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When setting the reflow soldering conditions, check for any problems by testing out the reflow soldering methods in advance.

Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

Precautions

- Notice
- Metal, ceramic, plastic package products
- Surface-mount products

Information described in this material is current as of July 2018.

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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