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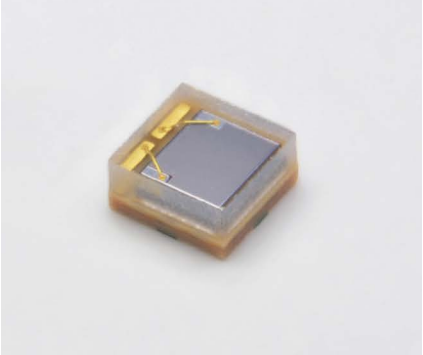
MPPC® (Multi-Pixel Photon Counter)



S15639-1325PS

Near infrared high sensitivity MPPC

The S15639-1325PS is a surface mount type MPPC designed for automotive LiDAR applications that achieves high sensitivity and low afterpulses.

Features

- **High photon detection efficiency: 9% (λ=905 nm)**
- **Low afterpulse probability: 1% max.**
- **High gain: 1.3 × 10^6**
- **Low crosstalk**

Applications

- **Distance measurement**
- **LiDAR**

Structure

Parameter	Specification	Unit
Effective photosensitive area	1.3 × 1.1	mm
Pixel pitch	25	μm
Number of pixels	2120	-
Package	Glass epoxy	-
Seal material	Silicone resin	-
Refractive index of window material	1.57	-
Thermal resistance*1	409	°C/W

*1: Between junction temperature and ambient temperature (typical example)

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Operating temperature	Topr	No dew condensation*2	-40 to +105	°C
Storage temperature	Tstg	No dew condensation*2	-40 to +125	°C
Soldering temperature	Tsol		260 (3 times)*3	°C
Output current (DC)	Imax	Average value	1	mA

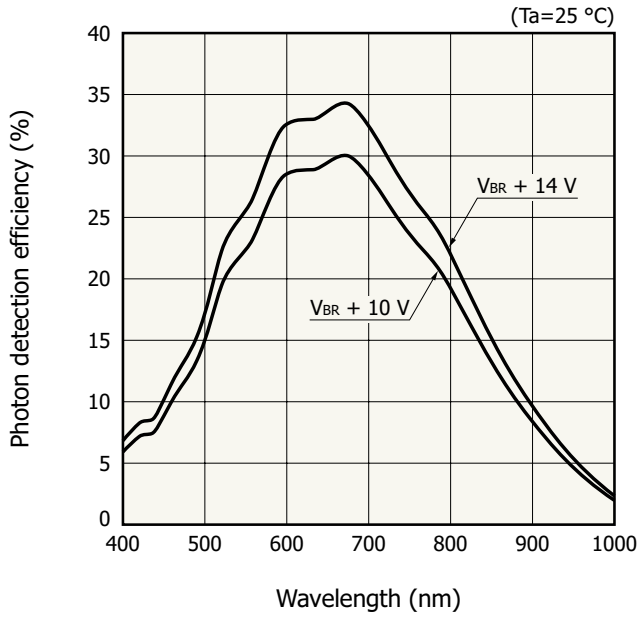
*2: When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.
*3: Reflow soldering, JEDEC J-STD-020 MSL 2a, see P.7
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)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Spectral response range	λ		-	400 to 1000	-	nm
Peak sensitivity wavelength	λp		-	660	-	nm
Photon detection efficiency*4	PDE	λ=λp, V_R=V_{BR} + 10 V	-	30	-	%
		λ=905 nm, V_R=V_{BR} + 10 V	-	7.5	-	
		λ=905 nm, V_R=V_{BR} + 14 V*5	-	9	-	
Breakdown voltage	V_{BR}		37	42	47	V
Recommended operating voltage*6	Vop	*5	-	V_{BR} + 10 V	V_{BR} + 14 V	V
Vop variation in a reel*7	-		-	±0.25	-	V
Dark current	I_D		-	0.2	0.45	μA
Dark count rate*8	DCR	V_R=V_{BR} + 10 V	-	0.7	2.0	Mcps
Crosstalk probability		V_R=V_{BR} + 10 V	-	4	-	%
Afterpulse probability		V_R=V_{BR} + 10 V	-	-	1	%
Recovery time	trecvr	V_R=V_{BR} + 10 V	-	46	-	ns
Terminal capacitance	Ct	V_R=V_{BR} + 10 V, f=100 kHz	-	42	-	pF
Gain	M	V_R=V_{BR} + 10 V	-	1.3×10^6	-	-
Temperature coefficient of Vop	ΔTVop		-	81	-	mV/°C

*4: Photon detection efficiency does not include crosstalk and afterpulses.
*5: When using V_R more than V_{BR} + 10 V, provide a protective resistance over 5 kΩ or an appropriate current limiting circuit.
*6: Refer to the data attached to each product.
*7: The center value of the recommended operating voltage (Vop) of products in the reel is indicated on the label attached to the reel.
*8: Threshold=0.5 p.e.

Photon detection efficiency vs. wavelength (typical example)



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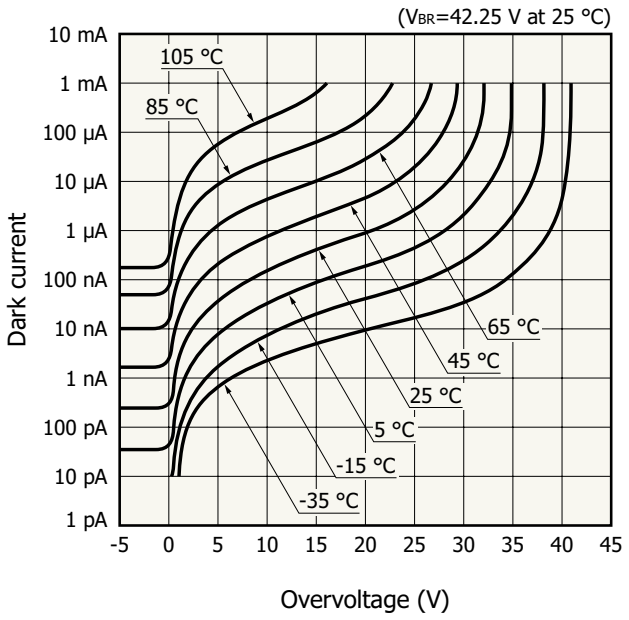
Dark current vs. overvoltage (typical example)



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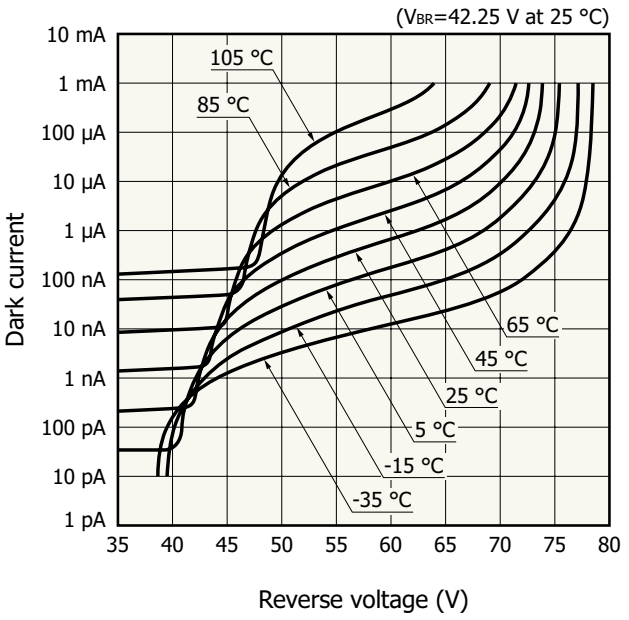
Dark current vs. reverse voltage (typical example)



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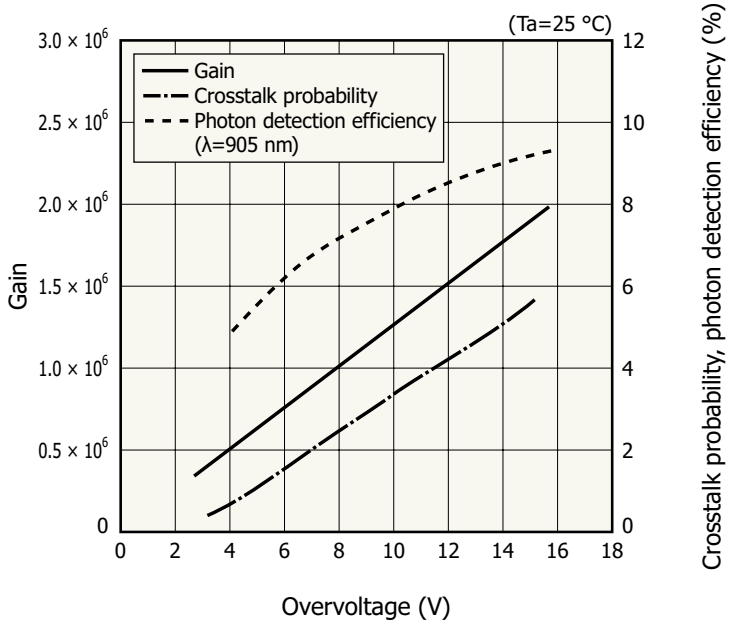
Gain, crosstalk probability, photon detection efficiency vs. overvoltage (typical example)



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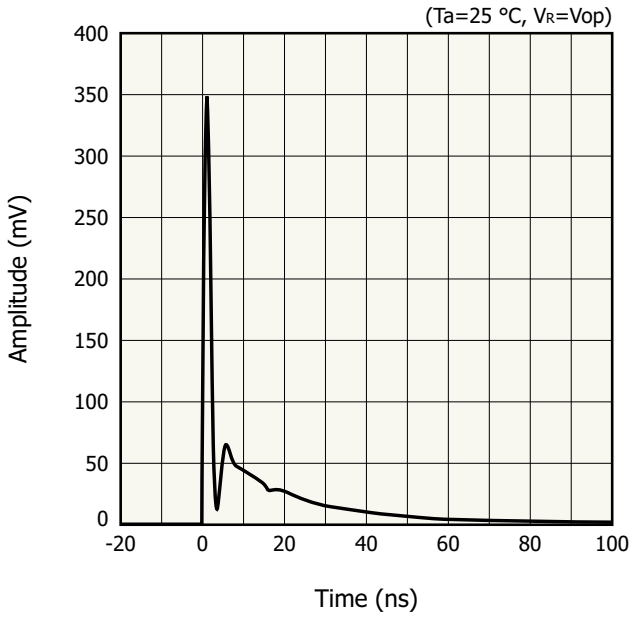
Pulse waveform



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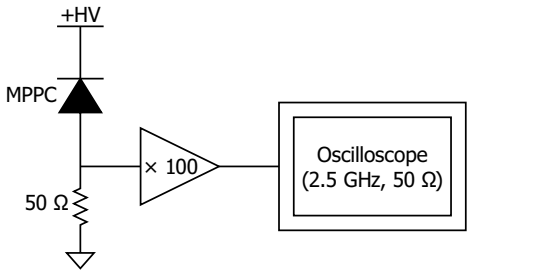
■ Measurement circuit



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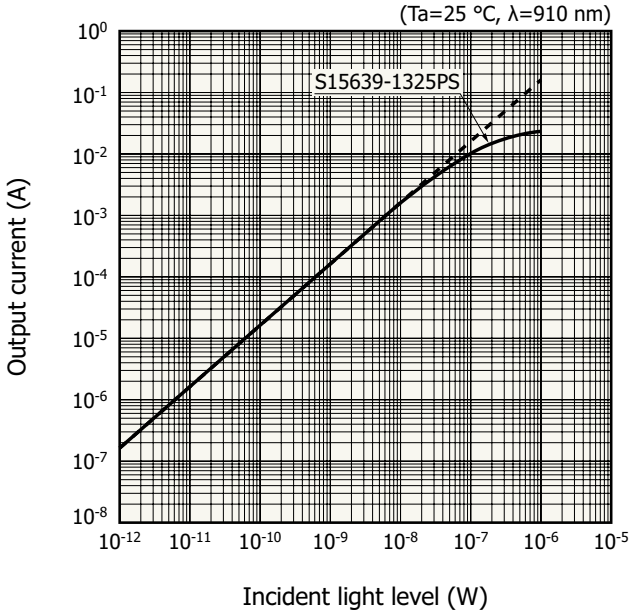
Linearity (typical example)



* This graph does not include the reduction of linearity due to heat.

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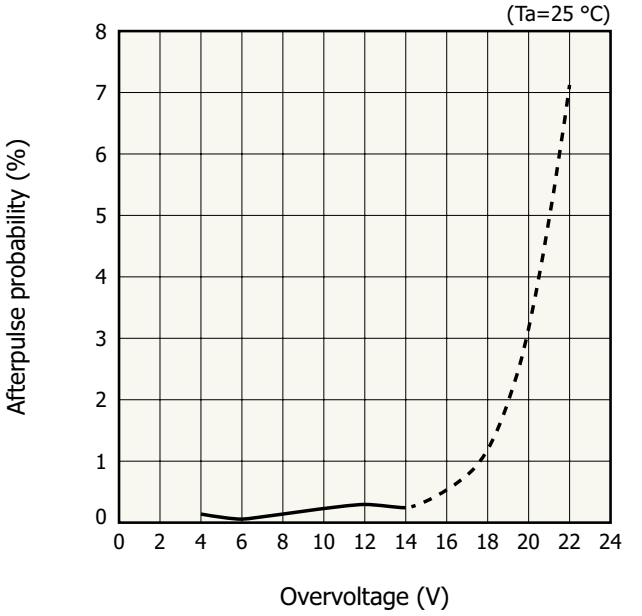
Afterpulse probability vs. overvoltage (typical example)



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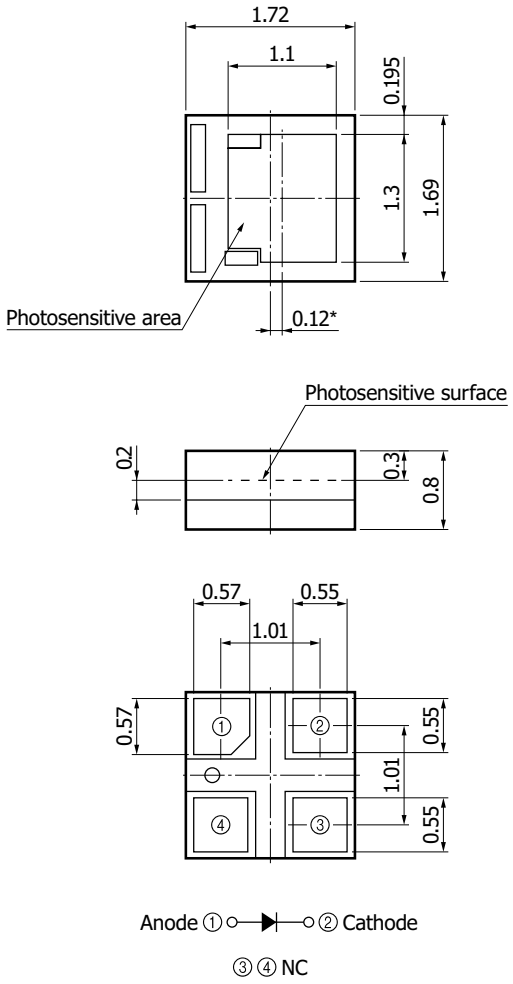
Dimensional outline (unit: mm)



Tolerance unless otherwise noted: ±0.1
* Distance from package center to photosensitive area center

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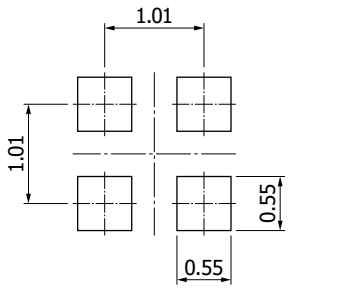
Recommended land pattern (unit: mm)



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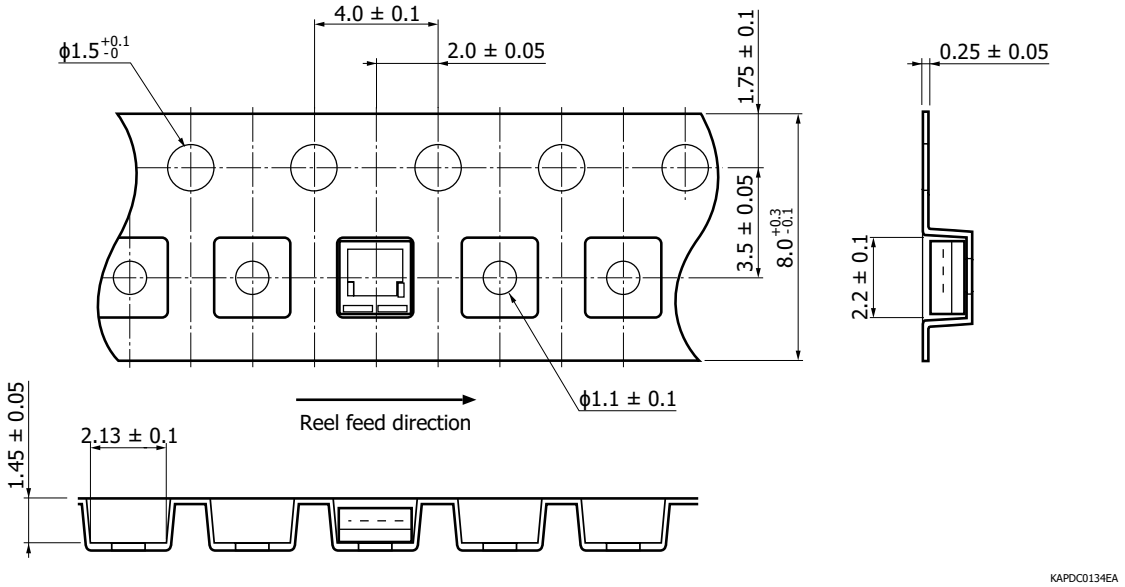
Standard packing specifications

■ Reel (conforms to JEITA ET-7200)

Outer diameter	Hub diameter	Tape width	Material	Electrostatic characteristics
180 mm	60 mm	8 mm	PS	Conductive

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



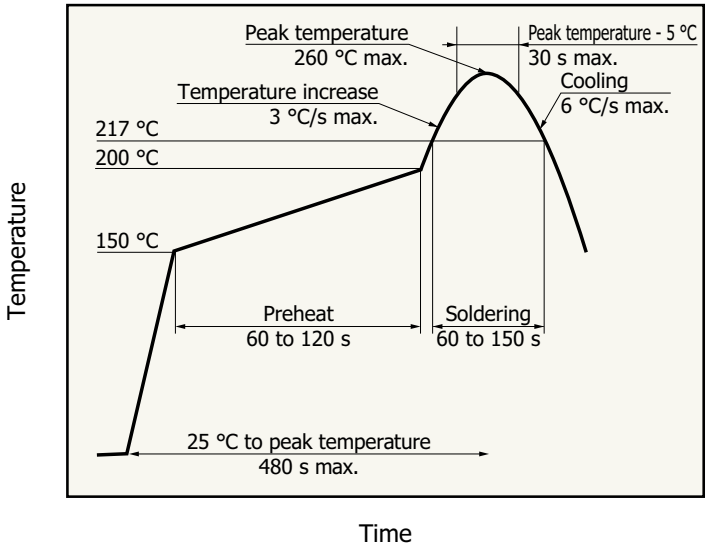
■ Packing quantity
1000 pcs/reel

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

Precaution

Overcurrent may flow depending on ambient temperature, incident light level, heat dissipation status, and applied bias. If an overcurrent flows, the element temperature may rise, causing damage to the product.

Recommended reflow soldering conditions



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- After unpacking, store the device in an environment at a temperature range of 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 4 weeks.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

Baking

If more than 12 months have passed in the unopened state, or storage conditions are exceeded after opening the package, baking is required to remove moisture before reflow soldering. For the baking, refer to "Precautions / Surface mount type products" in the related information.

■ Recommended baking conditions

Temperature: 120 °C, 3 hours, up to twice
Note: Before setting the baking conditions, perform experiments to confirm that no problems occur with the product.

Related information

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

■ Precautions
- Disclaimer
- Precautions / Metal, ceramic, plastic package products
- Precautions / Surface mount type products

■ Catalogs
- Product information / MPPC
- Technical note / MPPC
- Literature / MPPC

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