

S14645 series

High speed, compact Si APD for LiDAR (900 nm band) featuring low-bias operation

The S14645 series is a compact, surface mount type Si APD that achieves high sensitivity in the 800 nm band. This is suitable for laser monitoring of optical rangefinders widely used from consumer electronics to industrial use.

Features

- **Small package: 3.1 × 1.8 × 1.0^t mm**
- **Peak sensitivity wavelength: 840 nm (M=100)**
- **Low bias operation: Breakdown voltage=195 V max.**
- **High-speed response: Cutoff frequency=600 MHz typ. (λ=900 nm, M=100)**
- **Reduction of breakdown voltage variation: 175 ± 20 V**

Applications

- **Optical rangefinders**

Structure

Parameter	S14645-02	S14645-05	Unit
Photosensitive area size*1	φ0.2	φ0.5	mm
Effective photosensitive area	0.03	0.19	mm ²
Package	Glass epoxy (silicone resin)		-

*1: Photosensitive area in which a typical gain can be obtained

Absolute maximum ratings

Parameter	Symbol	Specification	Unit
Reverse current (DC)	I _R max	0.2	mA
Forward current	I _F max	10	mA
Operating temperature*2	T _{opr}	-30 to +100	°C
Storage temperature*2	T _{stg}	-40 to +100	°C
Soldering temperature	T _{sol}	260 (3 times)*3	°C

*2: No dew condensation

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.

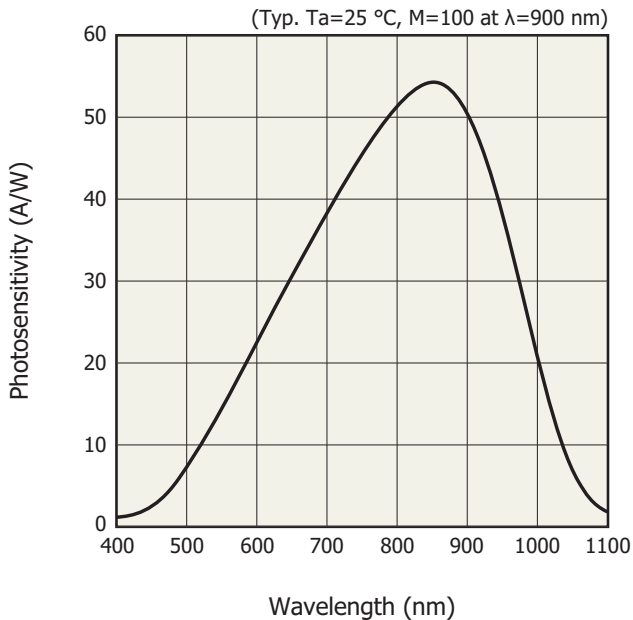
*3: Reflow soldering, JEDEC J-STD-020 MSL 2a, see P.5

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.

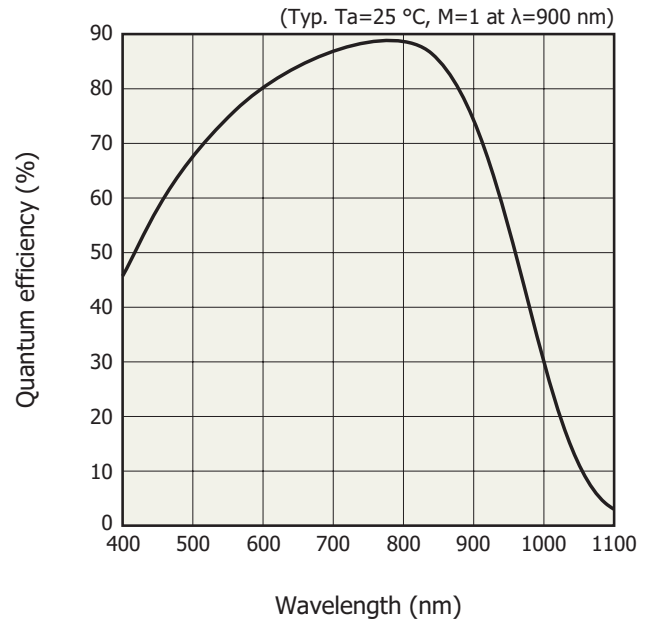
Electrical and optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	S14645-02			S14645-05			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral response range	λ		400 to 1100						nm
Peak sensitivity wavelength	λ_p		-	840	-	-	840	-	nm
Photosensitivity	S	$\lambda=900$ nm, M=1	-	0.5	-	-	0.5	-	A/W
Quantum efficiency	QE	$\lambda=900$ nm, M=1	-	70	-	-	70	-	%
Breakdown voltage	V _{BR}	I _D =100 μ A	155	175	195	155	175	195	V
Temperature coefficient of V _{BR}	$\Delta T/V_{BR}$		-	1.1	-	-	1.1	-	V/°C
Dark current	I _D	M=100	-	40	400	-	80	800	pA
Temperature coefficient of I _D	$\Delta T/I_D$	M=100	-	1.1	-	-	1.1	-	times/°C
Cutoff frequency	f _c	M=100, R _L =50 Ω $\lambda=900$ nm, -3 dB	-	600	-	-	600	-	MHz
Terminal capacitance	C _t	M=100, f=1 MHz	-	0.5	-	-	1.0	-	pF
Excess noise figure	x	M=100, $\lambda=900$ nm	-	0.3	-	-	0.3	-	-
Gain	M	$\lambda=900$ nm	-	100	-	-	100	-	-

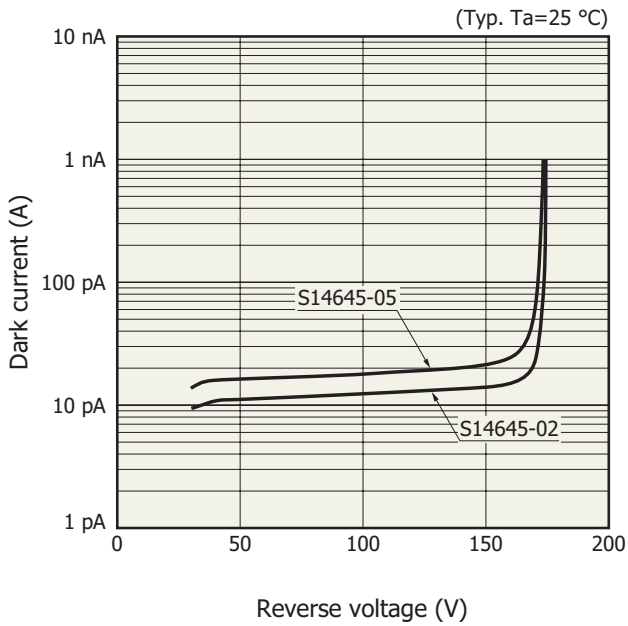
Spectral response



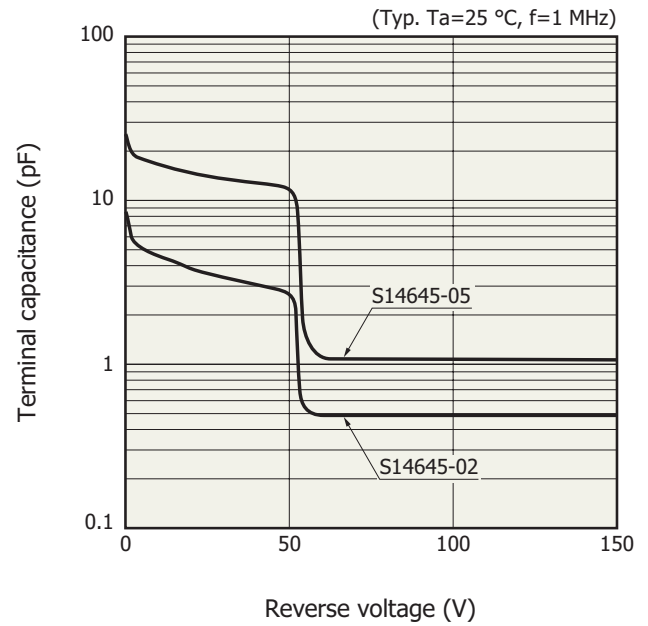
Quantum efficiency vs. wavelength



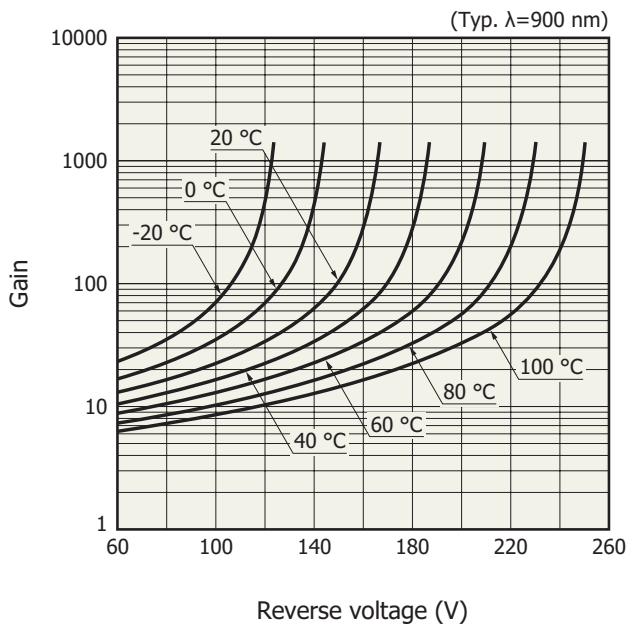
Dark current vs. reverse voltage



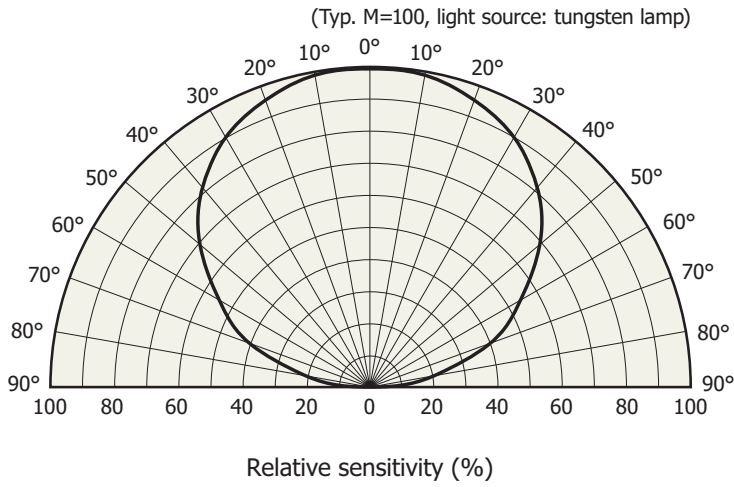
Terminal capacitance vs. reverse voltage



Gain vs. reverse voltage

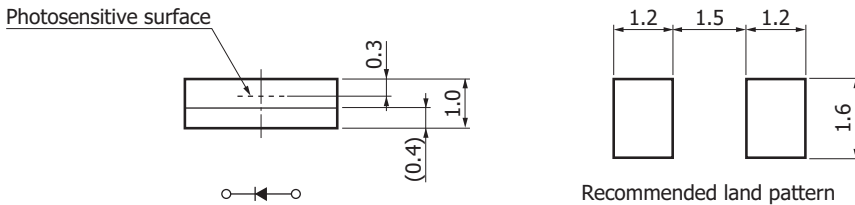
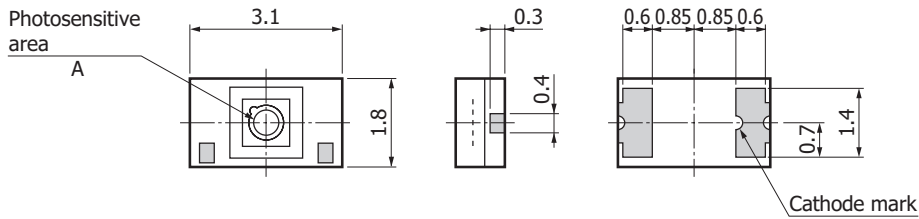


Directivity



KAPDB0450EA

Dimensional outline (unit: mm)



Tolerance unless otherwise noted: ± 0.2

Position accuracy of photosensitive area:
X, Y $\leq \pm 0.2$

Type no.	A
S14645-02	$\phi 0.2$
S14645-05	$\phi 0.5$

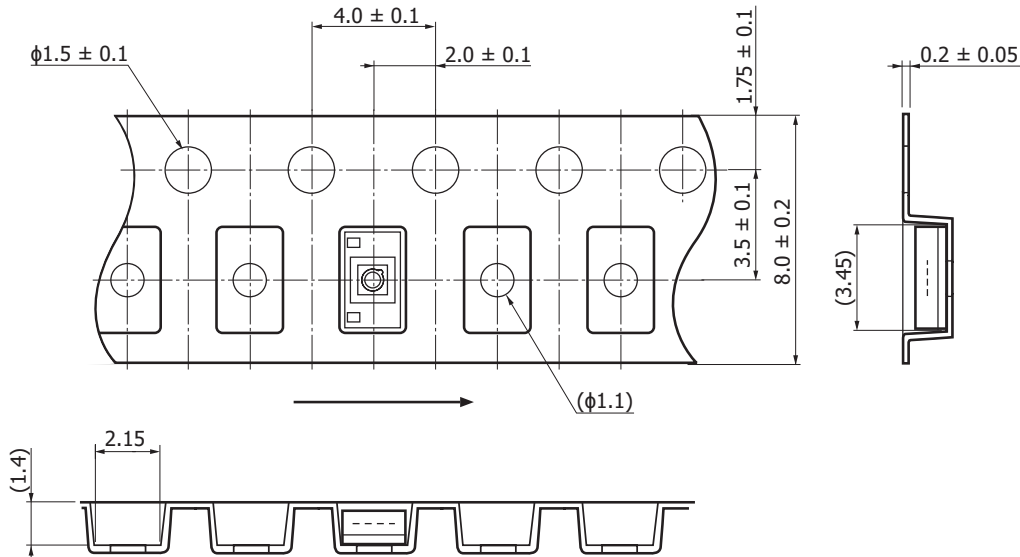
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Standard packing specifications

- Reel (conforms to JEITA ET-7200)

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

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



KPIN0023EB

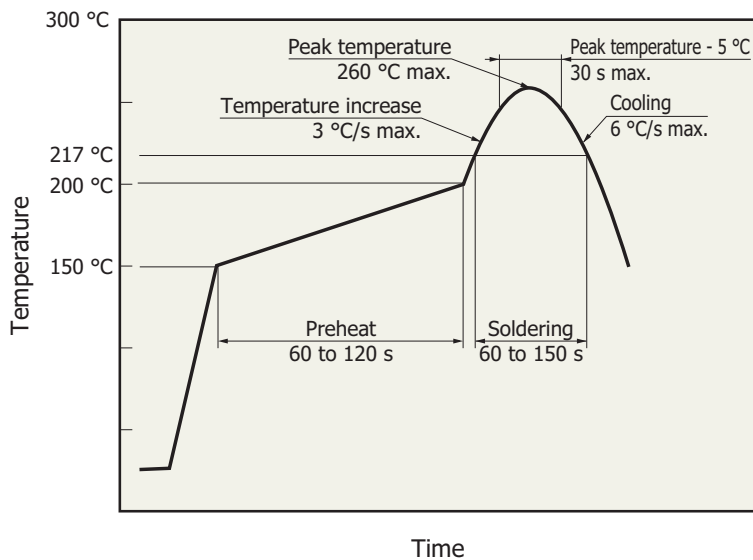
- Packing quantity

1000 pcs/reel

- Packing type

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

Recommended reflow soldering conditions



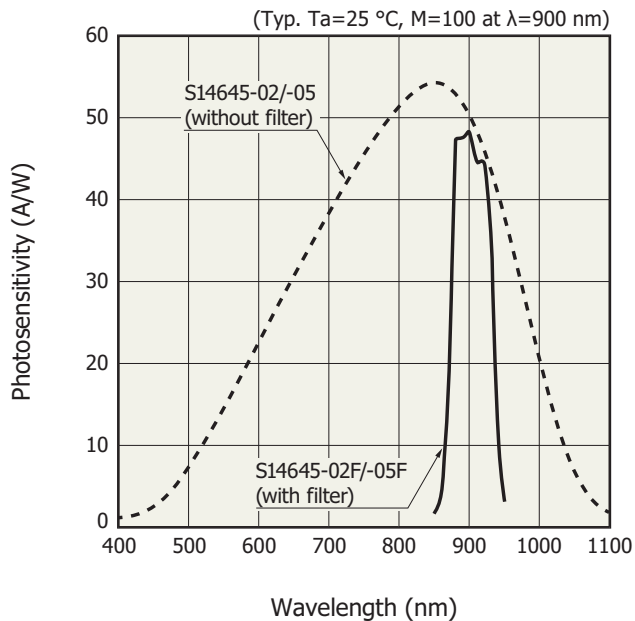
KMPDB0405EC

- After unpacking, store the device in an environment at a temperature of 30 °C or less 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 the 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.

Related products

Products with on-chip filter that transmits near infrared light (850 to 950 nm) are also available.

Spectral response



KAPDB0436EB

Related information

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

Precautions

- Disclaimer
- Surface mount type products

Technical information

- Si photodiodes / Technical note

Information described in this material is current as of March 2021.

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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