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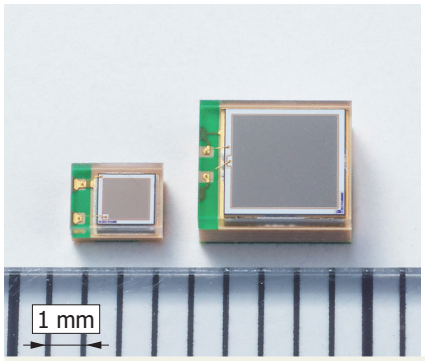
PHOTON IS OUR BUSINESS

MPPC® (multi-pixel photon counter)



S14160-1310PS/-1315PS/-3010PS/-3015PS

Low breakdown voltage, wide dynamic range type MPPC with small pixels

The S14160 series is a small-pixel MPPC that features wide dynamic range. Even with an extremely narrow pixel pitch of 10 or 15 µm, it features high fill factor, reduced crosstalk, and dark count.

Features

- **Small pixel pitch (10 µm, 15 µm)**
- **High fill factor**
- **Wide dynamic range**
- **Low voltage operation (V_{BR}=38 V typ.)**
- **Low crosstalk and afterpulses**
- **High gain: 10^5 order**

Applications

- **High energy physics experiments**
- **Fluorescence measurement**
- **Flow cytometry**
- **DNA sequencers**
- **Environmental analysis**

Structure

Parameter	Symbol	S14160				Unit
		-1310PS	-3010PS	-1315PS	-3015PS	
Effective photosensitive area	-	1.3 × 1.3	3 × 3	1.3 × 1.3	3 × 3	mm
Pixel pitch	-	10		15		µm
Number of pixels	-	16663	89984	7284	39984	-
Geometrical fill factor	-	31		49		%
Package	-	Surface mount type				-
Window	-	Silicone resin				-
Window refractive index	-	1.57				-

Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	Condition	Value	Unit
Reverse voltage	V_R max	-	48	V
Operating temperature	Topr	No dew condensation*1	-40 to +60	°C
Storage temperature	Topr	No dew condensation*1	-40 to +85	°C
Soldering temperature	Tsol		240*2 (3 times)	°C

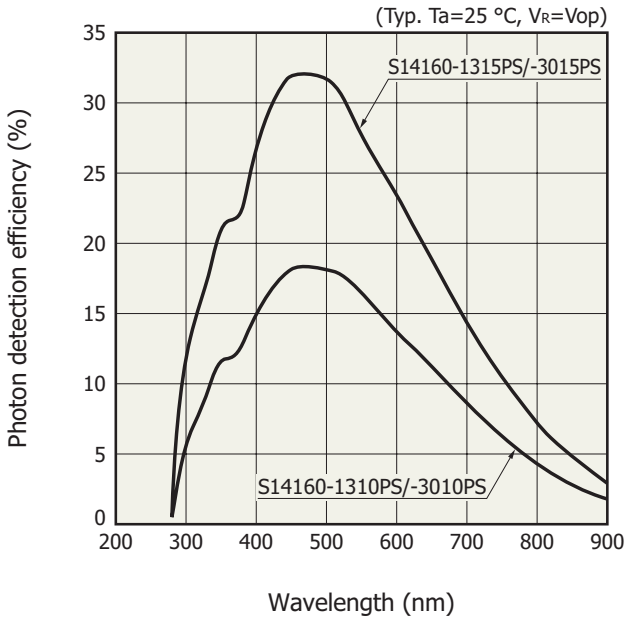
*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.
*2: Reflow temperature, JEDEC J-STD-020 MSL 2a, see P.9
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 (Typ. Ta=25 °C, VR=Vop, unless otherwise noted)

Parameter		Symbol	S14160				Unit
			-1310PS	-3010PS	-1315PS	-3015PS	
Spectral response range		λ	290 to 900				nm
Peak sensitivity wavelength		λp	460				nm
Photon detection efficiency at λp*3		PDE	18		32		%
Breakdown voltage*4		VBR	38±3				V
Recommended operating voltage*4		Vop	VBR + 5		VBR + 4		V
Vop variation within a reel		-	±0.1				V
Dark count rate*5	typ.	DCR	120	700	120	700	kcps
	max.		360	2100	360	2100	
Direct crosstalk probability		Pct	< 1				%
Terminal capacitance at Vop		Ct	100	530	100	530	pF
Gain		M	1.8 × 10^5		3.6 × 10^5		-
Temperature coefficient of Vop		ΔTVop	34				mV/°C

*3: Photon detection efficiency does not include crosstalk and afterpulses.
*4: Refer to the data attached for each product.
*5: Threshold=0.5 p.e.

Photon detection efficiency vs. wavelength



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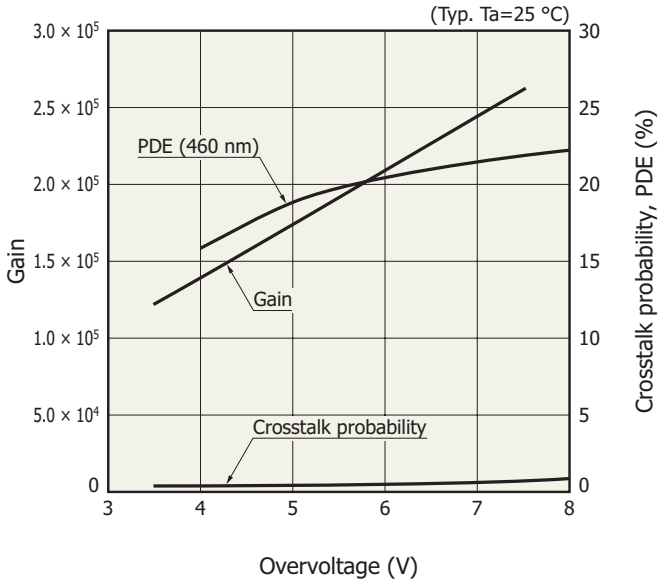
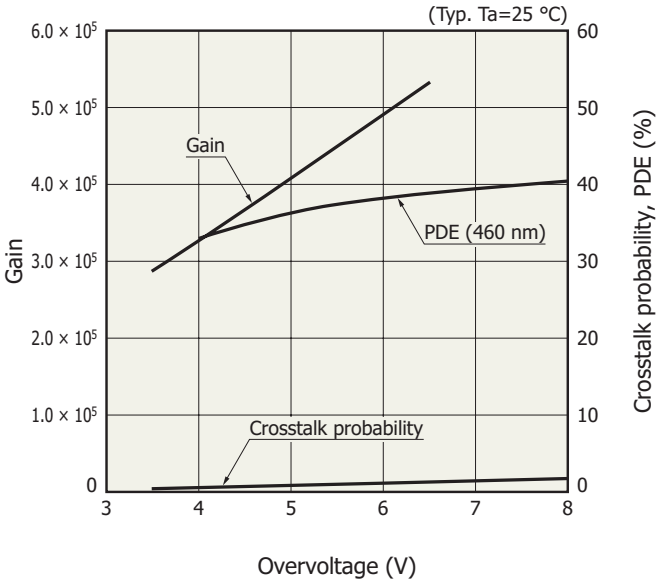
Gain, crosstalk probability, photon detection efficiency vs. over voltage

S14160-1310PS/-3010PS

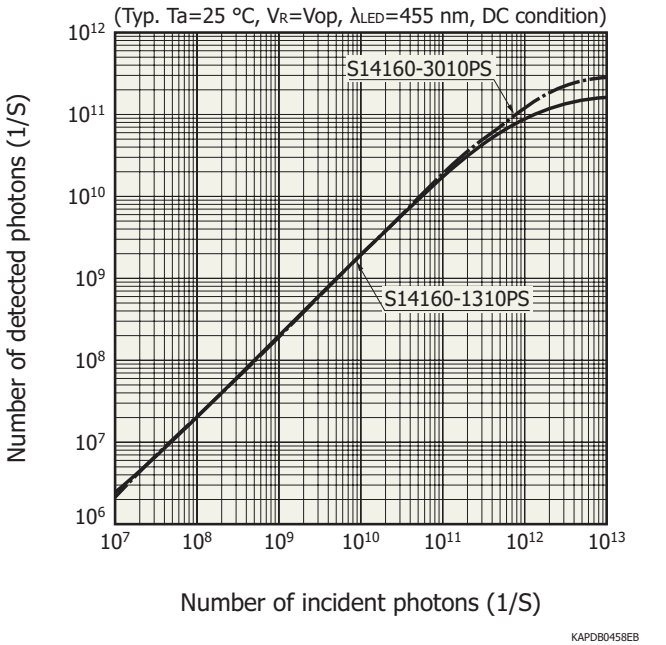


S14160-1315PS/-3015PS

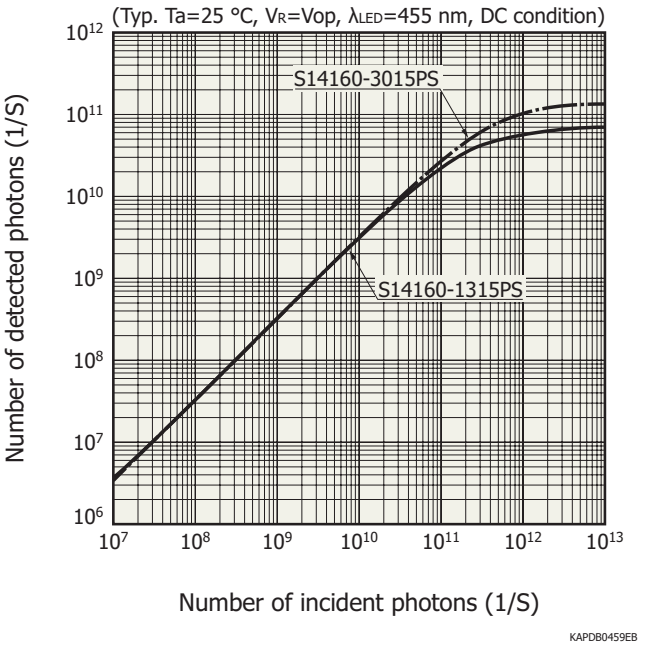


Linearity

S14160-1310PS/-3010PS

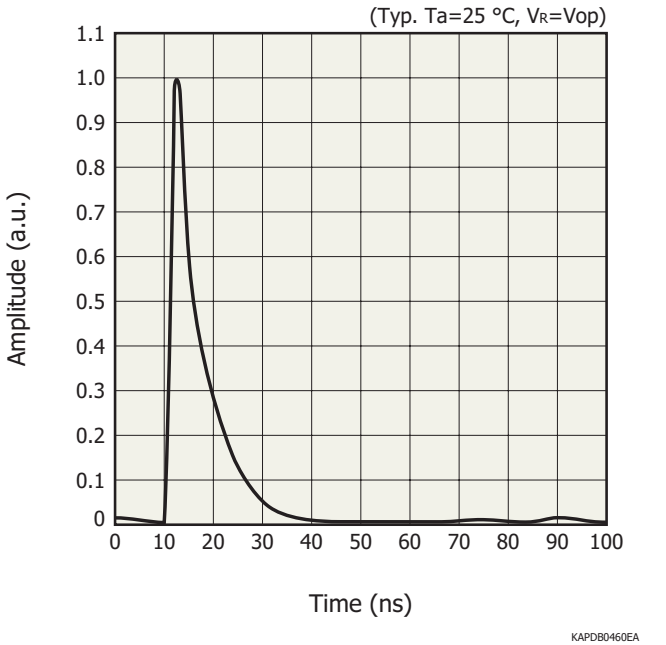


S14160-1315PS/-3015PS



1 photon equivalent pulse output

S14160-1310PS



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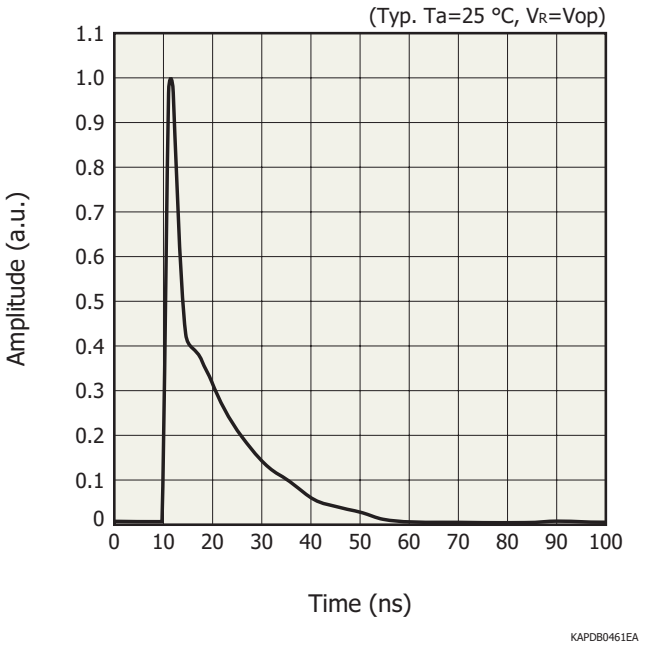
S14160-1315PS



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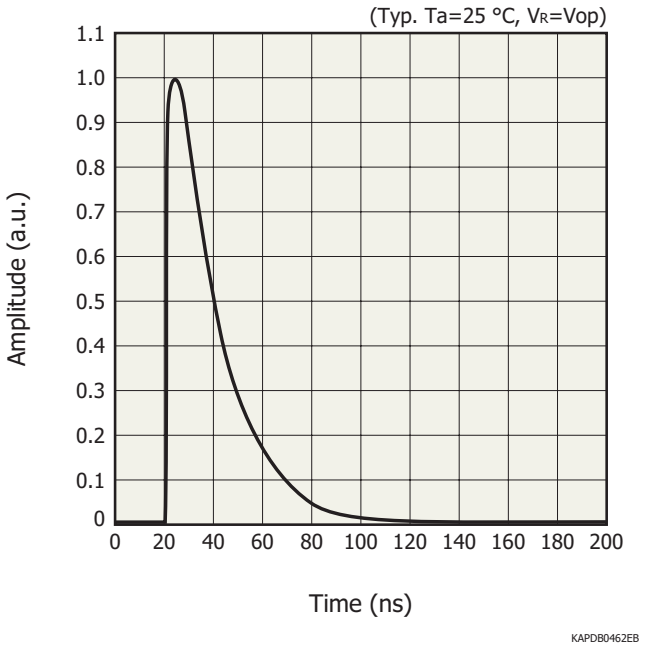
S14160-3010PS



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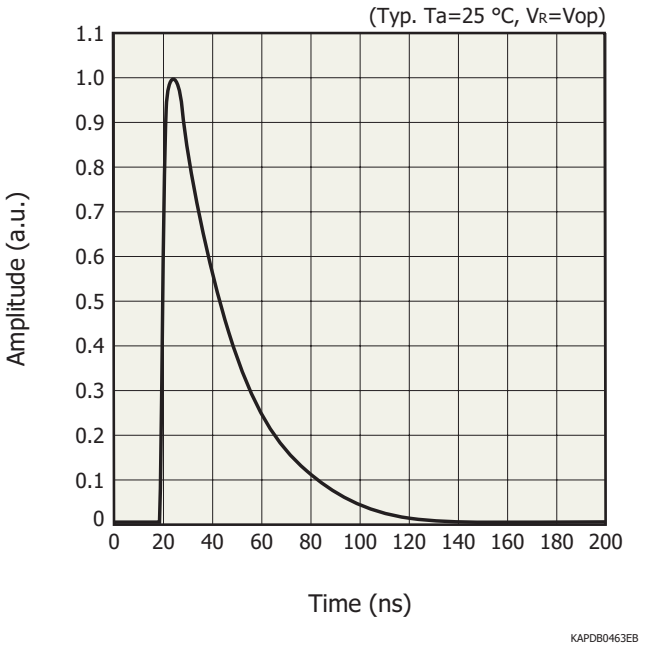
S14160-3015PS



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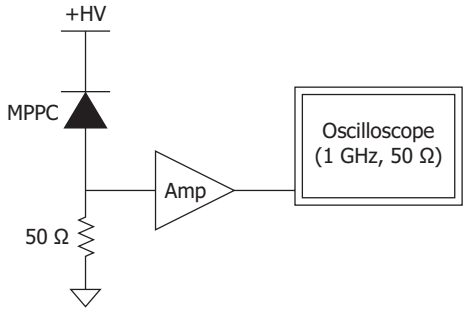
Waveform measurement setup



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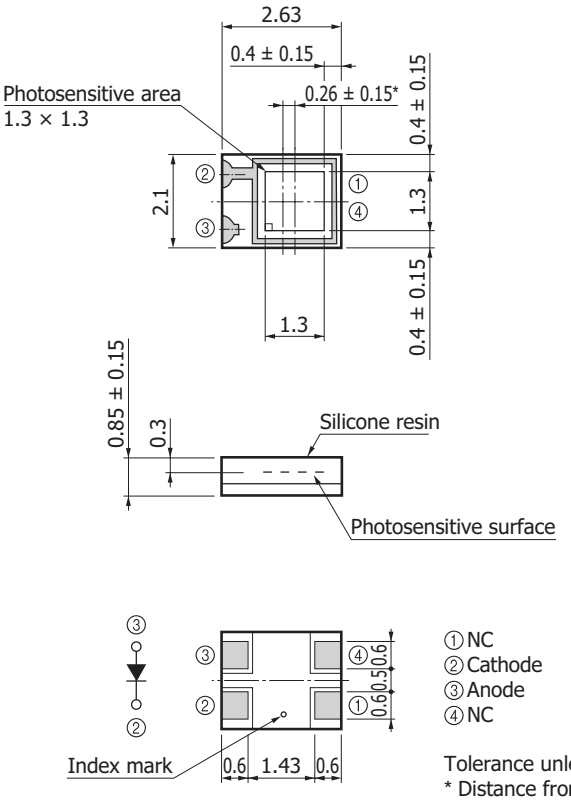
Dimensional outlines (unit: mm)

S14160-1310PS/-1315PS



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

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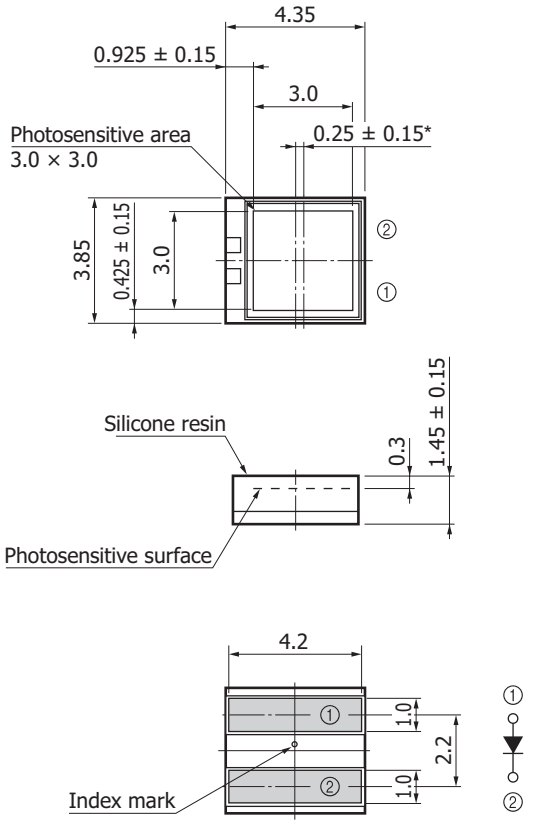
S14160-3010PS/-3015PS



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

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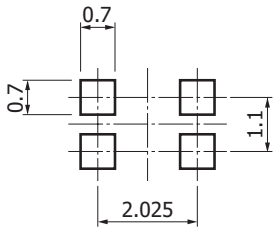
Recommended land patten (unit: mm)

S14160-1310PS/-1315PS



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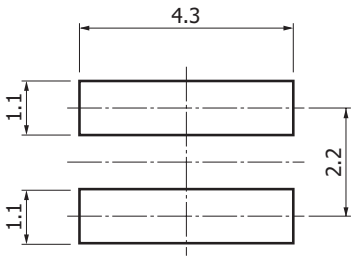
S14160-3010PS/-3015PS



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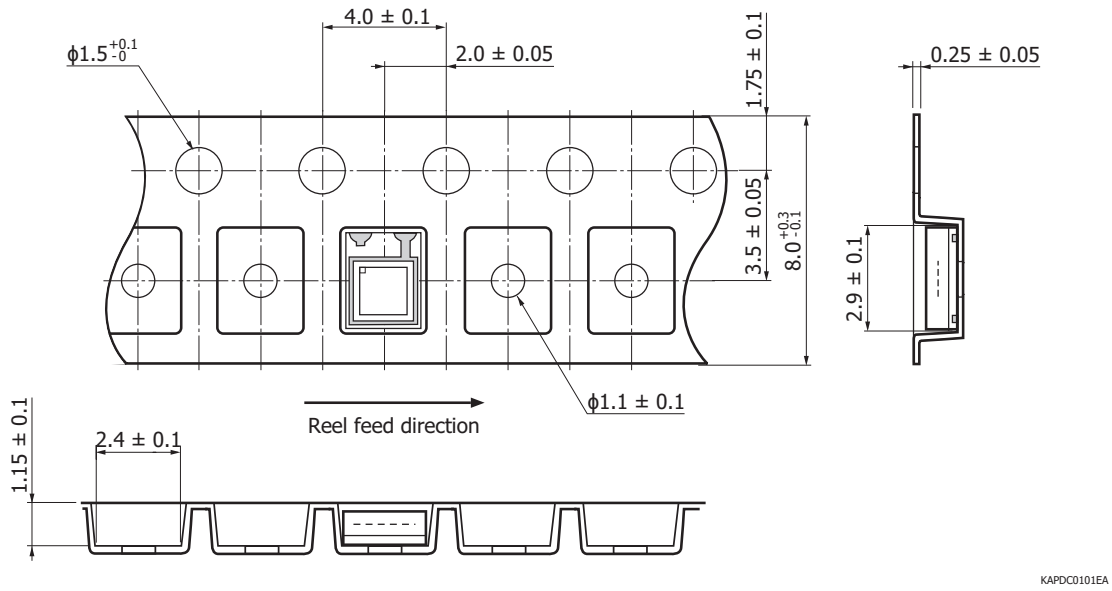
Standard packing specifications

S14160-1310PS/-1315PS

■ Reel (conforms to JEITA ET-7200)

Reel 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
300 pcs/reel

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

■ Lavel

Type No. _____
Lot No. _____
Vop _____
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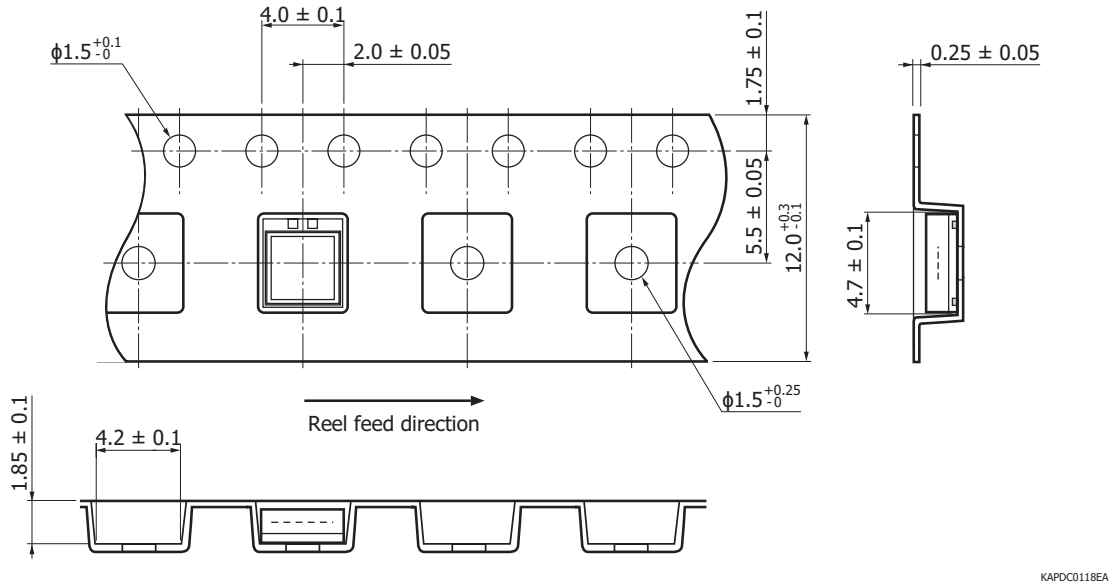
S14160-3010PS/-3015PS

■ Reel (conforms to JEITA ET-7200)

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

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



■ Packing quantity
300 pcs/reel

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

■ Lavel

Type No. _____
Lot No. _____
Vop _____
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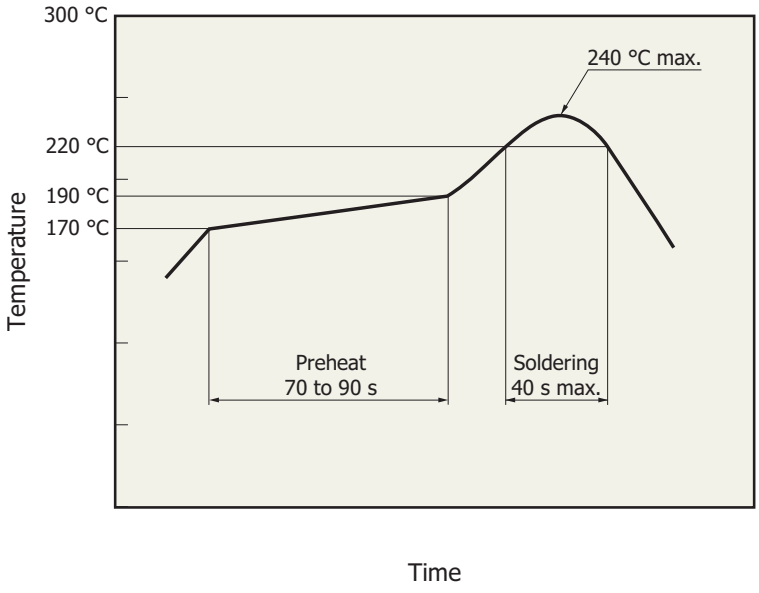
Recommended reflow soldering conditions



· This surface mount type 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 4 weeks.
· This 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, cheek that problems do not occur in the product by testing out the conditions in advance.

Precautions

· If necessary, incorporate appropriate protective circuits in power supplies, devices, and measuring instruments to prevent overvoltage and overcurrent.

Related information

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

■ Precautions
· Disclaimer
· Surface mount type products

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Cat. No.KAPD1070E03 Apr. 2023 DN