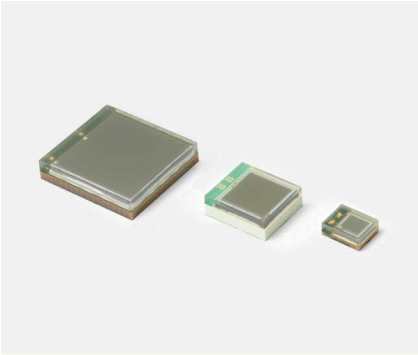
HAMAMATSU
PHOTON IS OUR BUSINESS

MPPC® (multi-pixel photon counter)



S14160-1310PS/-3010PS/-6010PS etc.

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

These are small pixel MPPCs that feature a 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

Type no.	Photosensitive area (mm)	Pixel pitch (µm)	Number of pixels	Fill factor (%)	Package	Window material	Window refractive index
S14160-1310PS	1.3 × 1.3	10	16663	31	Ceramic	Silicone resin	1.57
S14160-3010PS	3 × 3		89984				
S14160-6010PS NEW	6 × 6		359011				
S14160-1315PS	1.3 × 1.3	15	7284	49			
S14160-3015PS	3 × 3		39984				
S14160-6015PS NEW	6 × 6		159565				

Absolute maximum ratings (Ta=25 °C)

Type no.	Reverse voltage V_R (V)	Operating temperature Topr*1 (°C)	Storage temperature Tstg*1 (°C)	Soldering temperature (°C)
S14160-1310PS	48	-40 to +60	-40 to +85	240*2 (3 times)
S14160-3010PS				
S14160-6010PS NEW				
S14160-1315PS				
S14160-3015PS				
S14160-6015PS NEW				

*1: 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.
*2: Reflow soldering, 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.

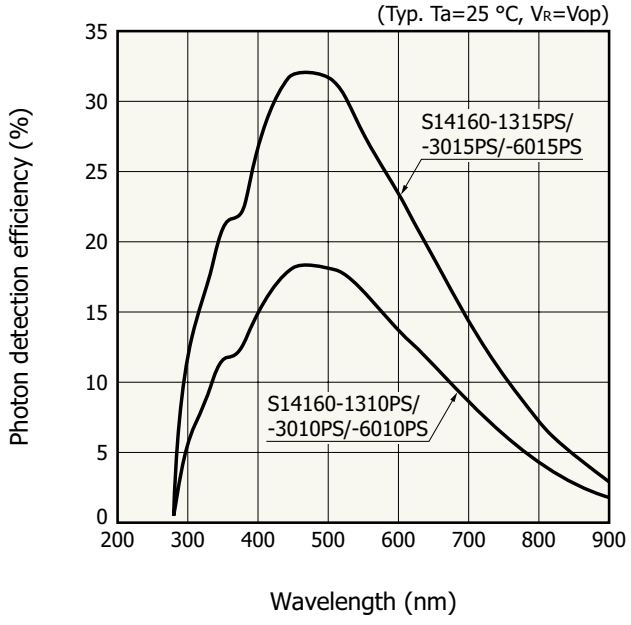
Electrical and optical characteristics (Typ. Ta=25 °C, V_R=Vop, unless otherwise noted)

Type no.	Spectral response range λ (nm)	Peak sensitivity wavelength λp (nm)	Photon detection wavelength at λp*3 PDE (%)	Breakdown voltage V_{BR} (V)	Recommended operating voltage*4 Vop (V)	Vop variation within a reel (V)
S14160-1310PS	290 to 900	460	18	38 ± 3	V_{BR} + 5	±0.1
S14160-3010PS						
S14160-6010PS NEW						
S14160-1315PS			32		V_{BR} + 4	
S14160-3015PS						
S14160-6015PS NEW						

Type no.	Dark count rate*5 DCR typ. (kcps)	Dark count rate*5 DCR max. (kcps)	Direct crosstalk probability Pct (%)	Terminal capacitance at Vop*6 Ct (pF)	Gain M	Temperature coefficient of Vop ΔTVop (mV/°C)
S14160-1310PS	120	360	<1	100	1.8×10^5	34
S14160-3010PS	700	2100		530		
S14160-6010PS NEW	3000	10000		2200		
S14160-1315PS	120	360		100	3.6×10^5	
S14160-3015PS	700	2100		530		
S14160-6015PS NEW	3000	10000		2200		

*3: Photon detection efficiency does not include crosstalk and afterpulse.
*4: Refer to the data attached for each product.
*5: Threshold=0.5 p.e.
*6: f=100 kHz

Photon detection efficiency vs. wavelength



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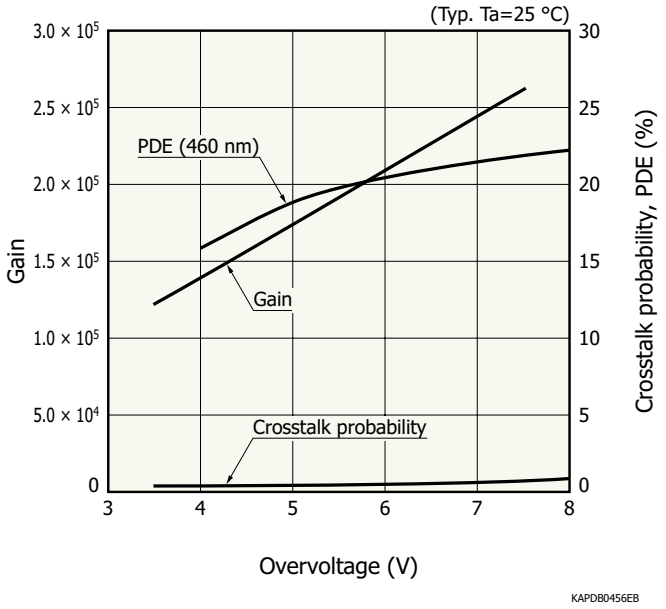
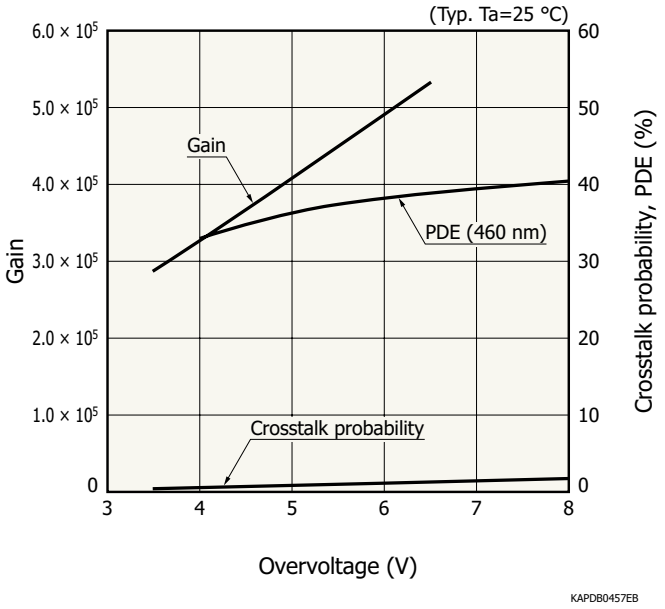
Gain, crosstalk probability, photon detection efficiency vs. over voltage

S14160-1310PS/-3010PS/-6010PS

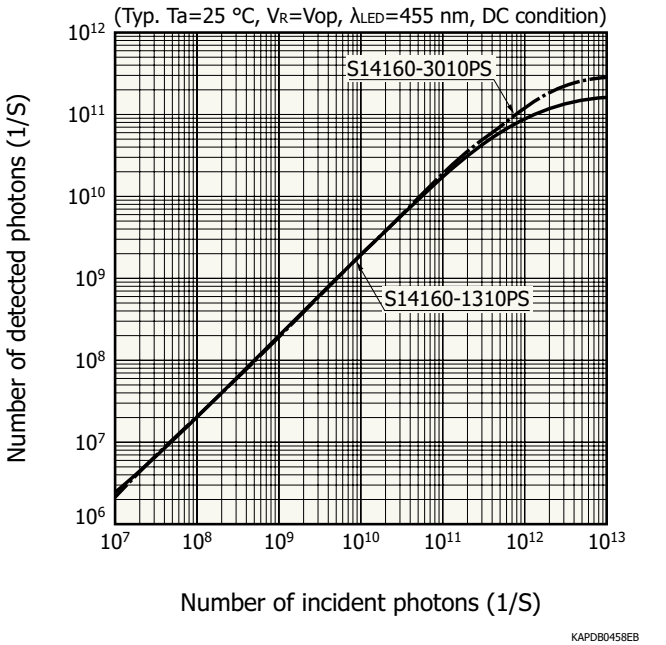


S14160-1315PS/-3015PS/-6015PS

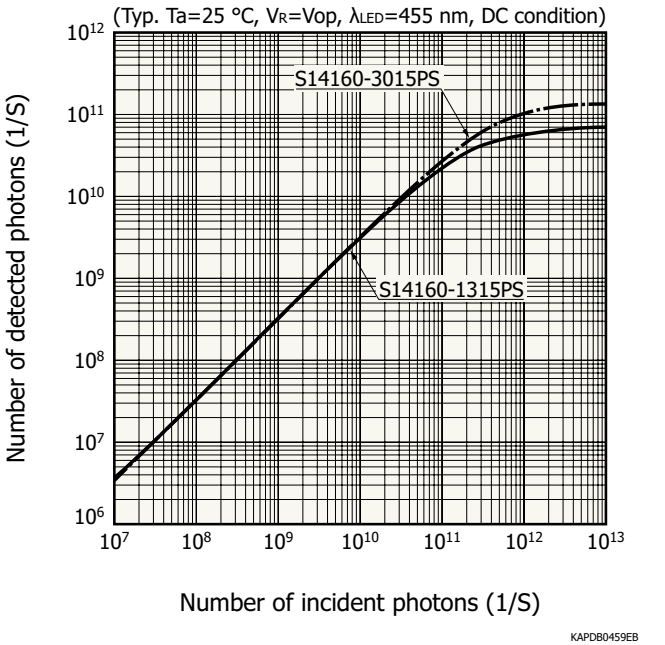


Linearity

S14160-1310PS/-3010PS

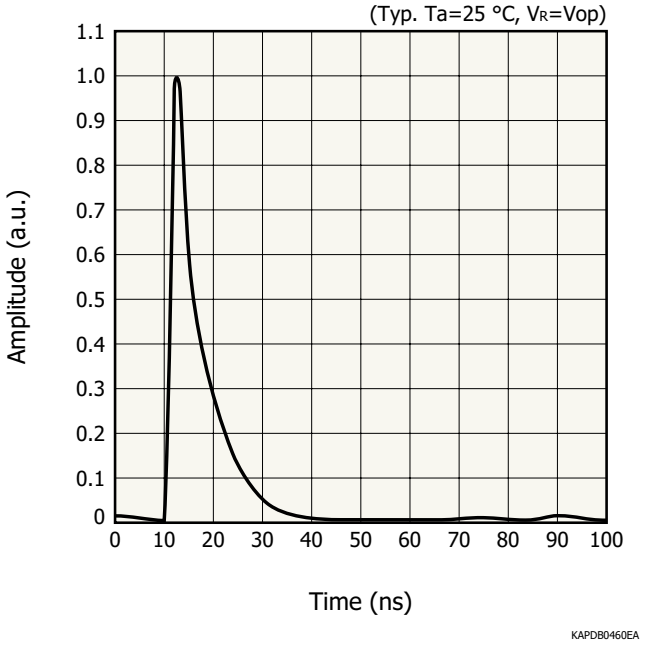


S14160-1315PS/-3015PS



1 photon equivalent pulse output

S14160-1310PS



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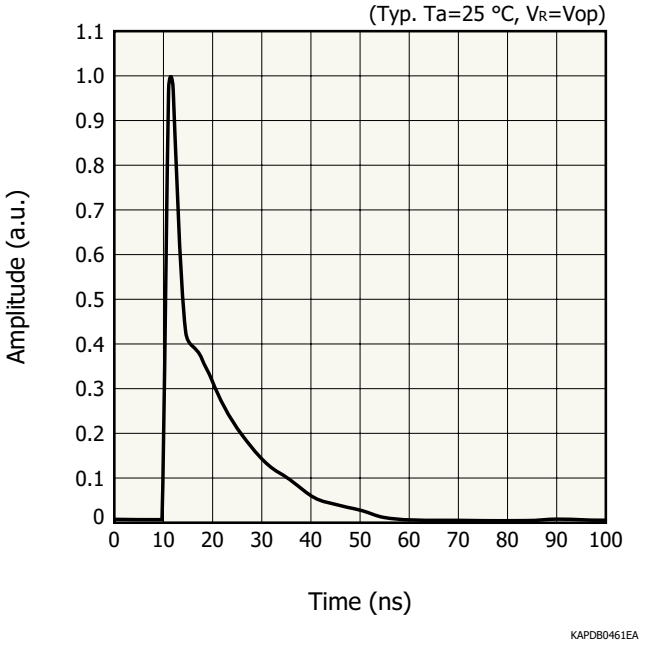
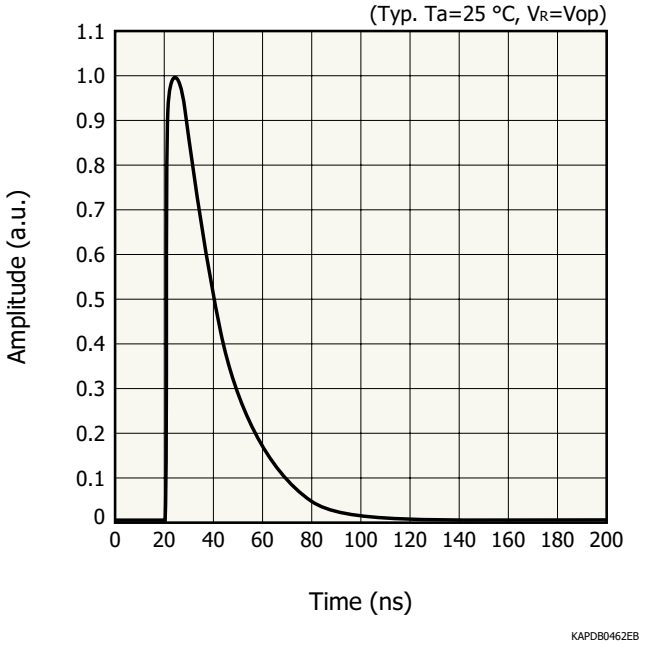
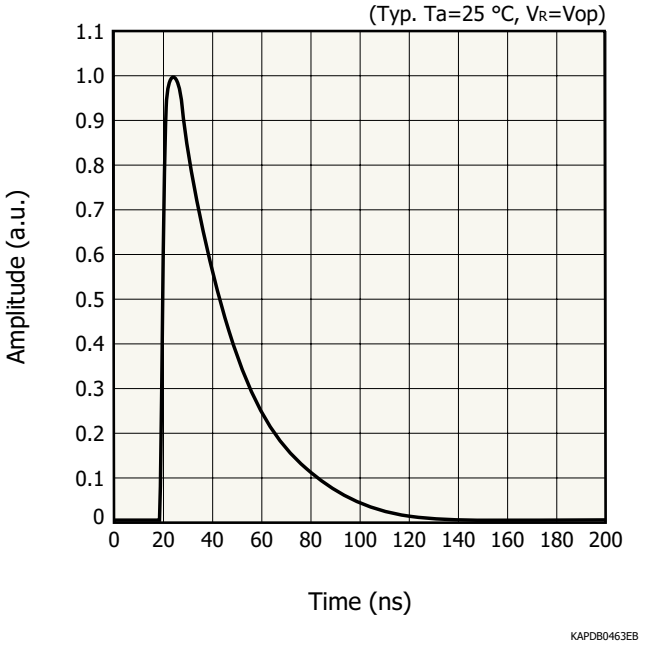


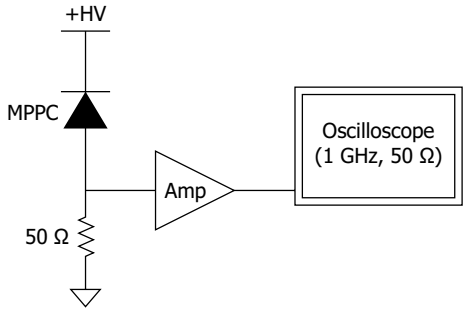
S14160-3010PS



S14160-3015PS



Waveform measurement setup



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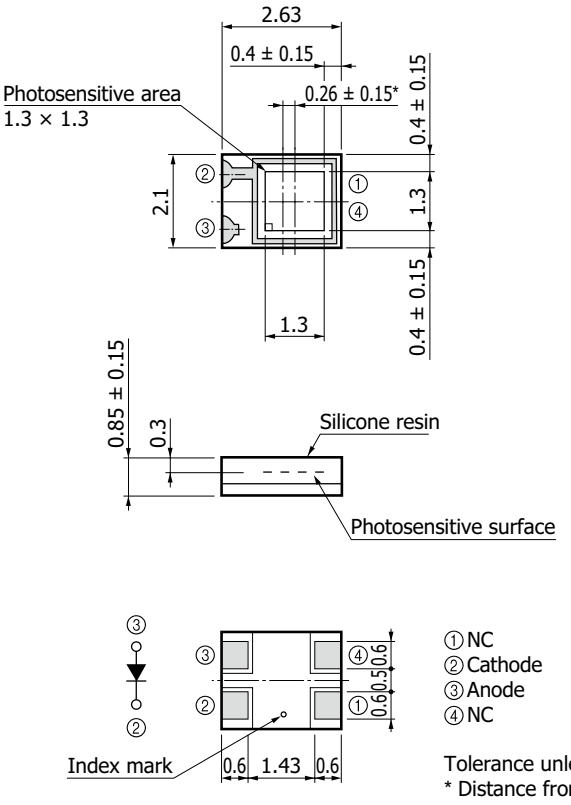
Dimensional outlines (unit: mm)

S14160-1310PS/-1315PS



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

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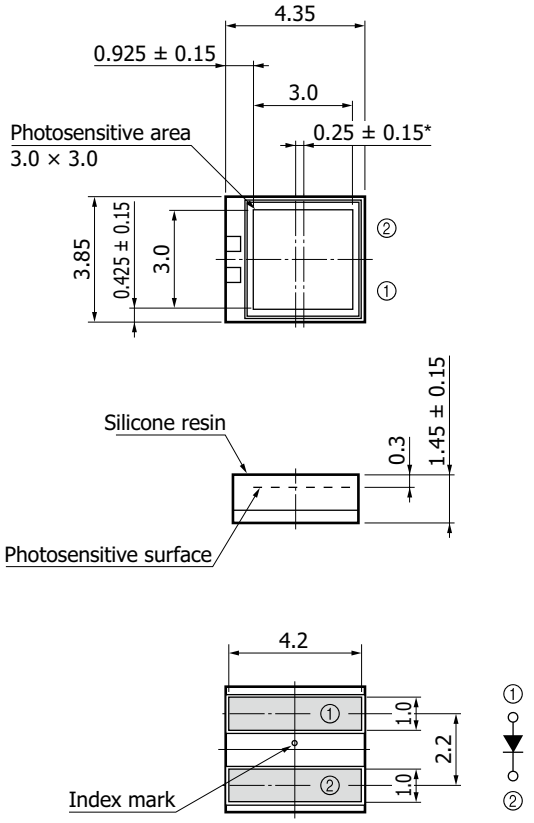
S14160-3010PS/-3015PS



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

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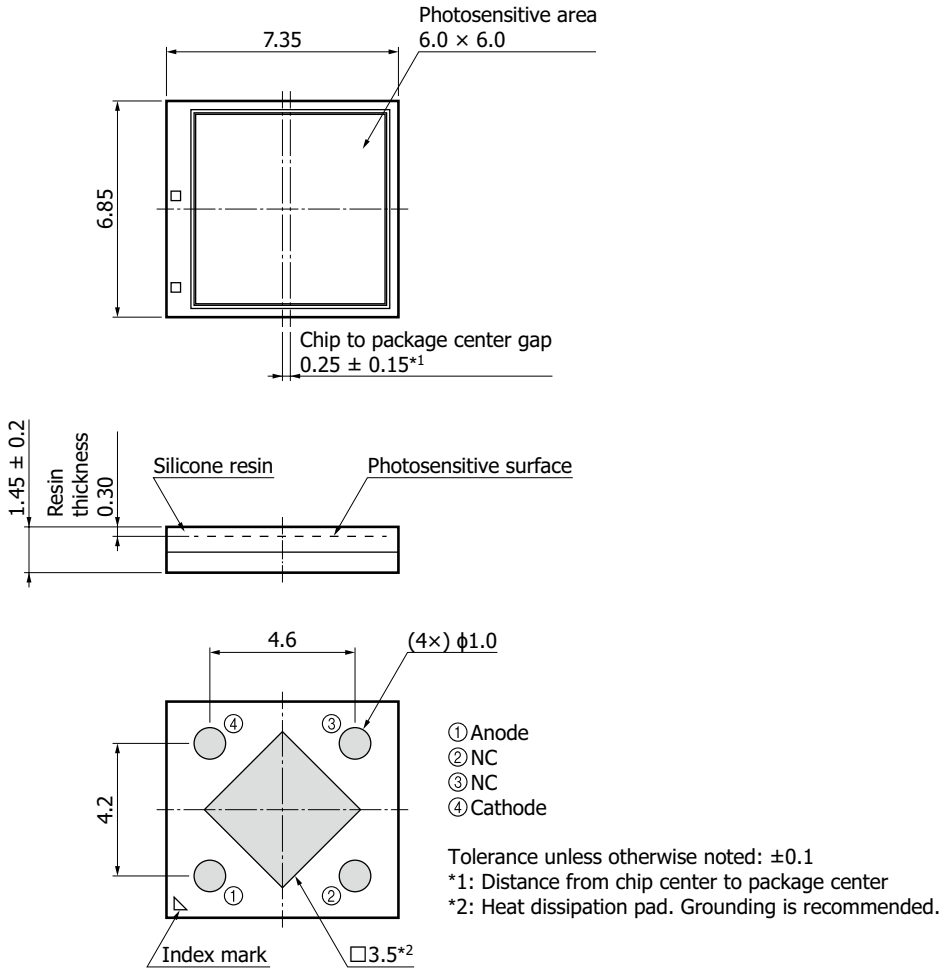
S14160-6010PS/-6015PS



Tolerance unless otherwise noted: ±0.1
*1: Distance from chip center to package center
*2: Heat dissipation pad. Grounding is recommended.

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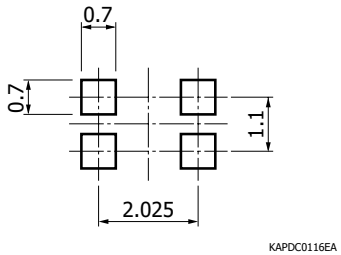
Recommended land patten (unit: mm)

S14160-1310PS/-1315PS



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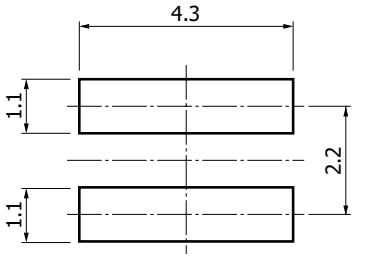
S14160-3010PS/-3015PS



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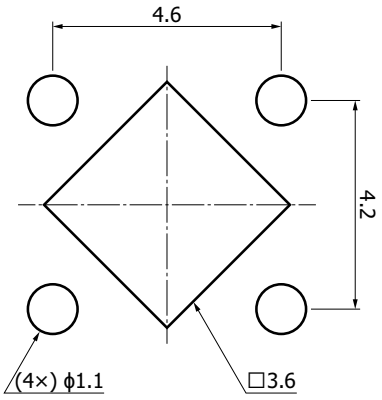
S14160-6010PS/-6015PS



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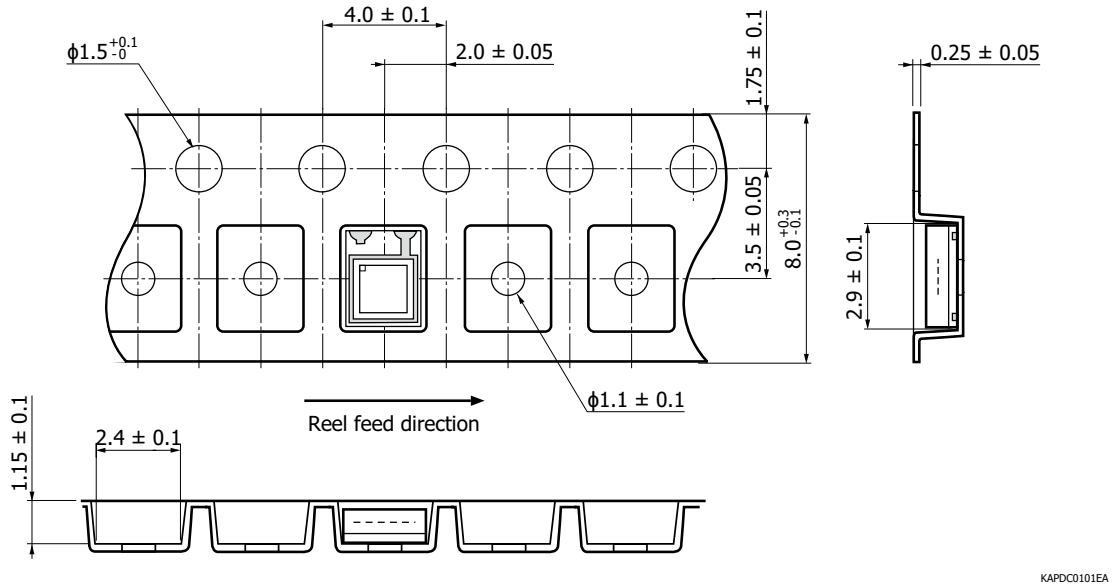
Standard packing specifications

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 (polystyrene)	Conductive

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



■ Packing quantity
300 pcs/reel

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

■ Label

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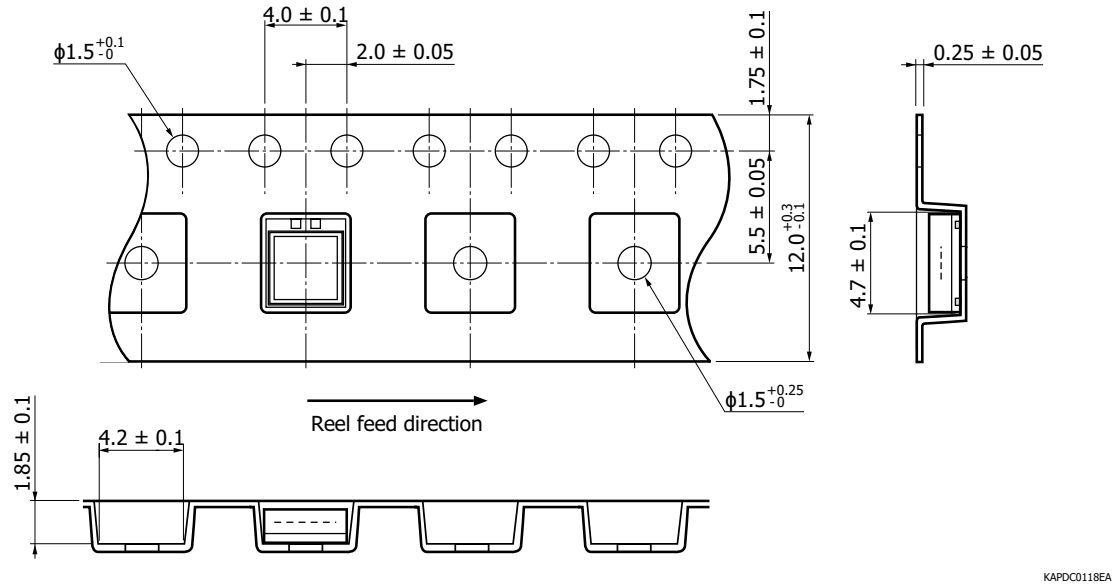
S14160-3010PS/-3015PS

■ Reel (conforms to JEITA ET-7200)

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

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



■ Packing quantity
300 pcs/reel

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

■ Label

Type No. _____
Lot No. _____
Vop _____
HAMAMATSU
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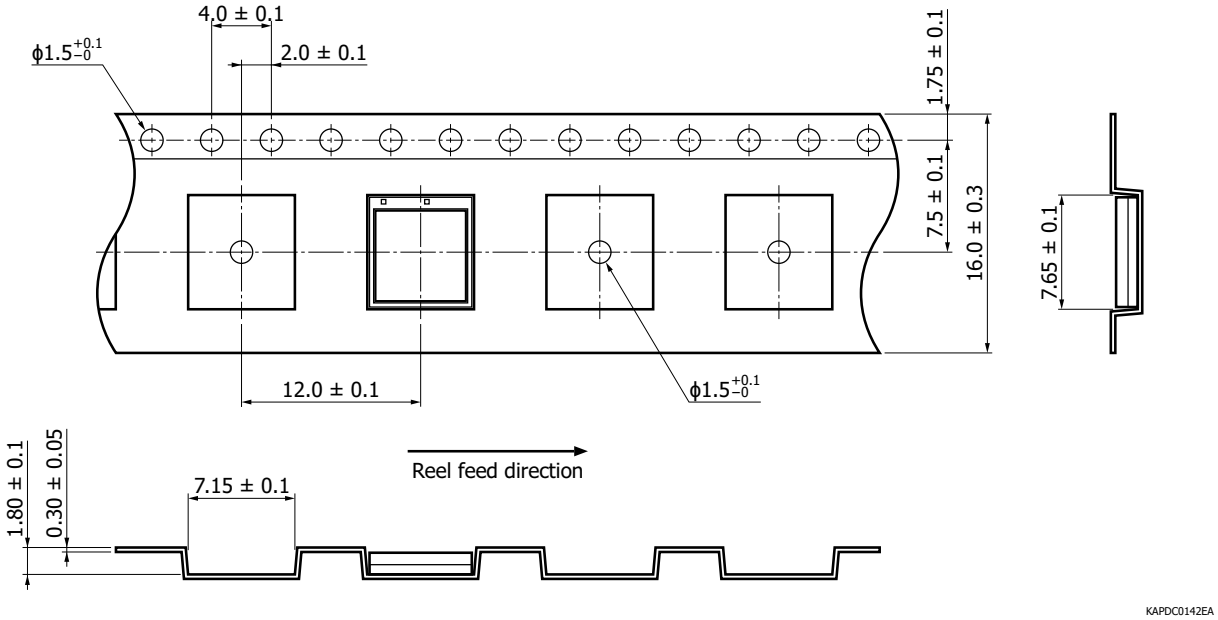
S14160-6010PS/-6015PS

■ Reel (conforms to JEITA ET-7200)

Reel diameter	Hub diameter	Tape width	Material	Electrostatic characteristics
254 mm	80 mm	16 mm	PS (polystyrene)	Conductive

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



■ Packing quantity
300 pcs/reel

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

■ Label

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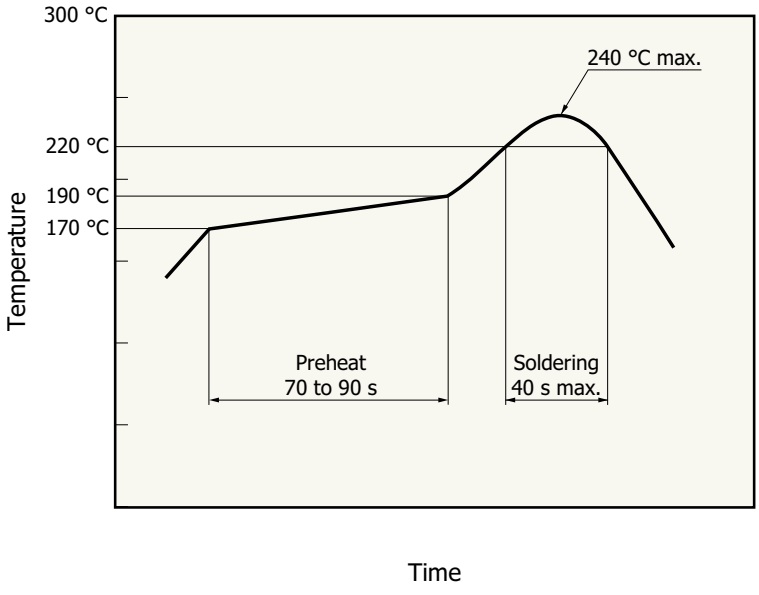
Recommended reflow soldering conditions



· 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.

Baking

If 4 weeks have passed in an unpacked state, or the storage period in the table above has passed after opening, perform baking before reflow soldering to behumidify. For the baking, refer to the precautions "Surface mount type products."

■ Recommended baking conditions

Temperature: 150 °C, 3 hours, up to twice
Note: When you set baking conditions, check 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

■ Technical note
· MPPC

Information described in this material is current as of April 2024.
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.
The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.

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