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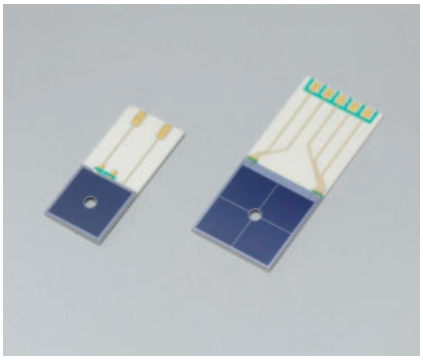
NEW

Electron beam detector Si photodiode



S11141 S11142

High sensitivity, direct detection of low energy (2 keV or more) electron beams

Features

- **Direct detection of low energy (2 keV or more) electron beams with high sensitivity**
- **High gain: 1100 times (incident electron energy: 5 keV)**
- **Large active area size**
  S11141: 10 × 10 mm
  S11142: 14 × 14 mm
- **ϕ2.0 mm hole in center of active area**
  Design is suitable for use with backscattered electron detector of SEM.
- **S11142: 4-element photodiode**
  Detects reflection electron beam position (angle)
- **Thin ceramic package**
  Allows short-distance arrangement between the electron gun and a sample in a SEM
- **Uses a wiring board made of less magnetic materials that are unlikely to affect electron beam trajectories.**

Applications

- **Backscattered electron detector for scanning electron microscope (SEM)**

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Reverse voltage	V_R max.	Ta=25 °C	20	V
Operating temperature*1	Topr		-20 to +60	°C
Storage temperature*1	Tstg		-20 to +80	°C

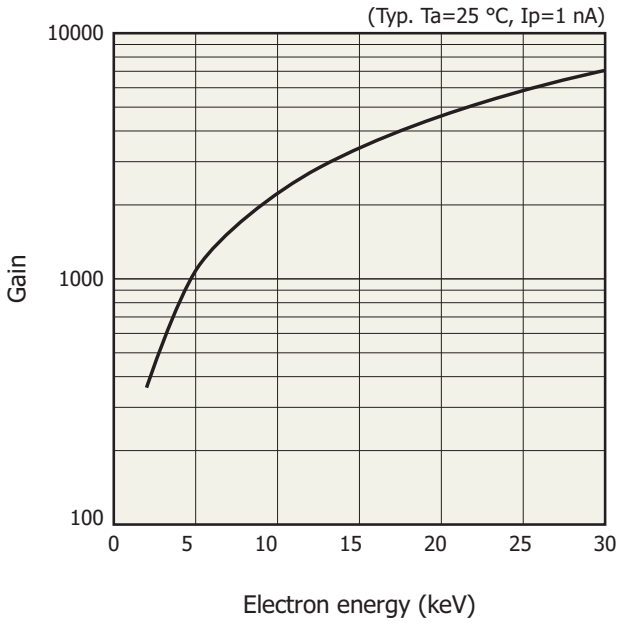
*1: No condensation

Electrical and optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	S11141			S11142*2			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Incident electron energy range	-		2	-	30	2	-	30	keV
Output current	Isc	Electron energy 5 keV Ip=1 nA*3	-	1.1	-	-	1.1	-	μA
Dark current	I_D	V_R=10 mV	-	0.1	1	-	0.05	0.5	nA
		V_R=5 V	-	5	50	-	1	25	
Terminal capacitance	Ct	V_R=0 V, f=10 kHz	-	2000	3300	-	900	1500	pF
		V_R=5 V, f=1 MHz	-	500	850	-	250	420	
Cut-off frequency	fc	V_R=0 V, R_L=50 Ω λ=400 nm, -3 dB	-	0.5	-	-	1	-	MHz
		V_R=5 V, R_L=50 Ω λ=400 nm, -3 dB	-	4	-	-	7	-	
Electron multiplying gain	-	Electron energy 5 keV	-	1100	-	-	1100	-	-

*2: Per 1 element
*3: Injection current (probe current)

Gain vs. electron energy



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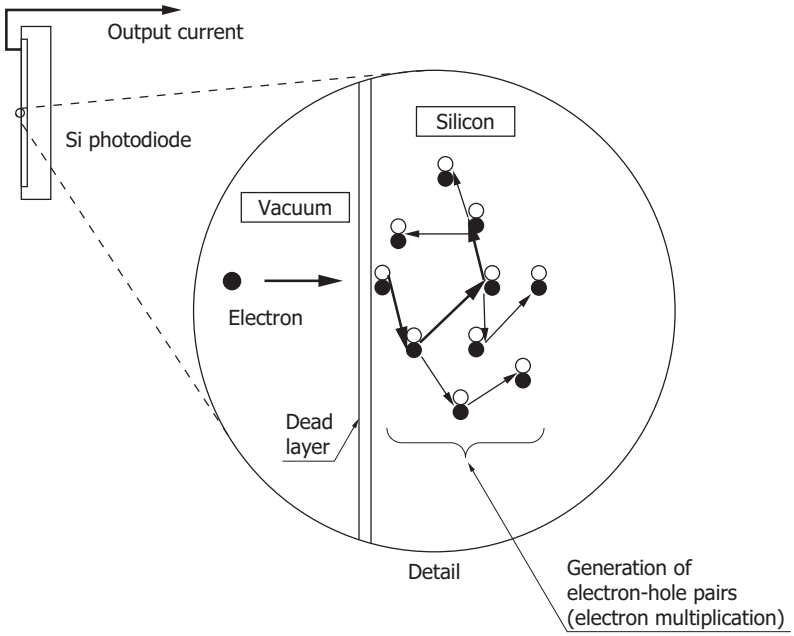
Electron multiplication principle



Electrons generate ions as they pass through silicon. This ionization process generates a large number of electron-hole pairs that then multiply the number of electrons.
The electron multiplication can boost the output current by approximately 1100 times at an input electron energy of 5 keV (refer to "Gain vs. electron energy").

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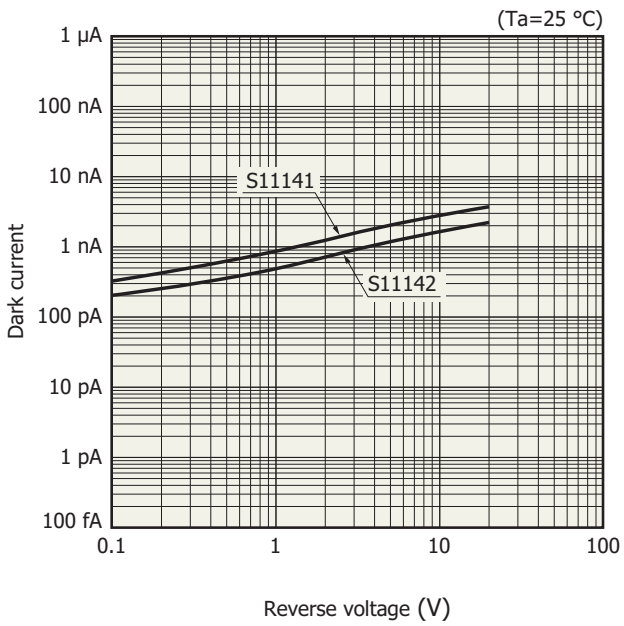
Dark current vs. reverse voltage (typical example)



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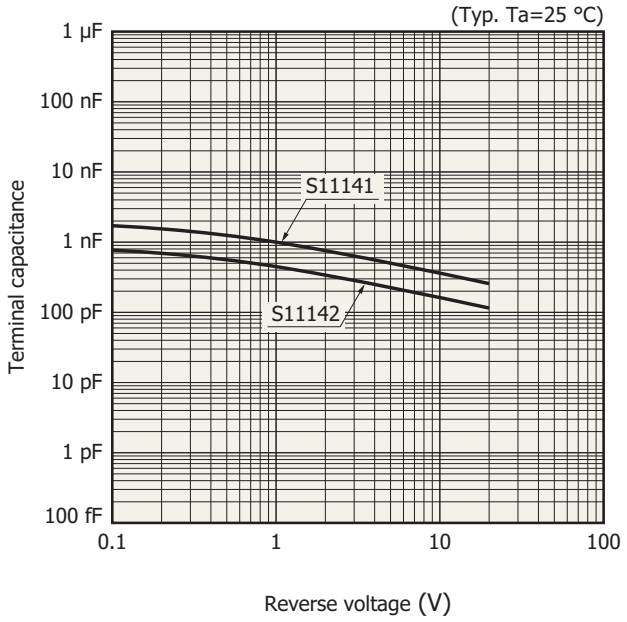
Terminal capacitance vs. reverse voltage



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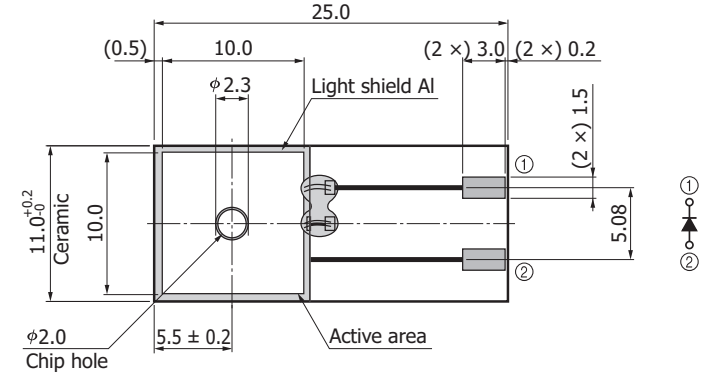
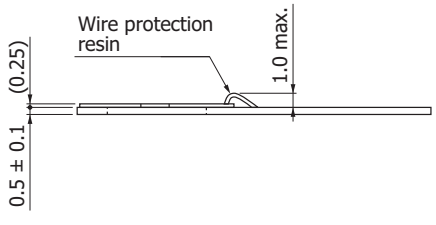
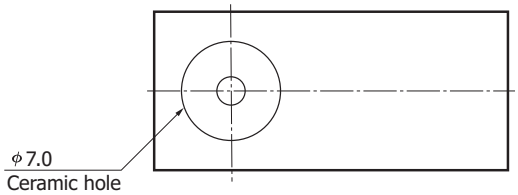
Dimensional outlines (unit: mm, tolerance unless otherwise noted: ±0.2)

S11141







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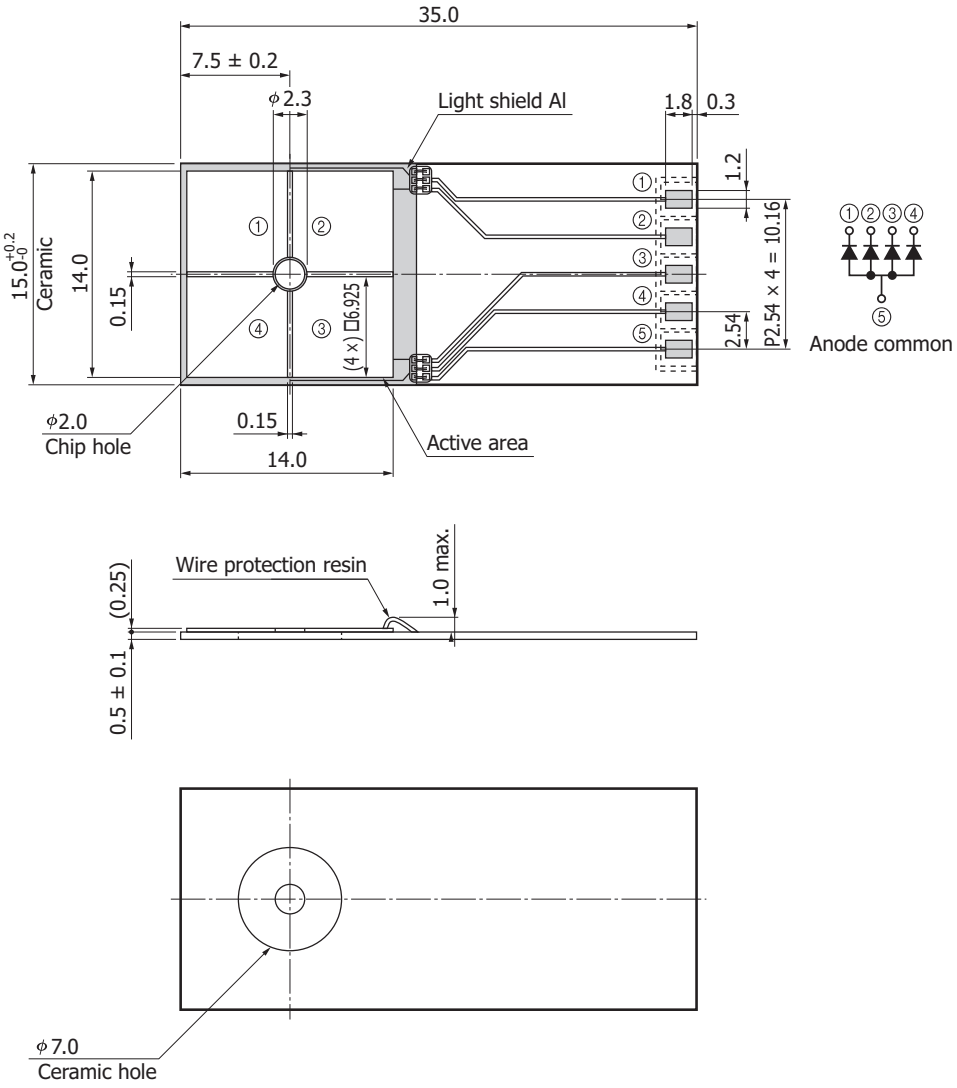

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Recommend soldering conditions

- Soldering temperature: below 260 °C
- Soldering time: within 5 seconds

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