Film solar cell
Amorphous silicon type
Low illumination solar cell

BCS series

FEATURE

- Thin, lightweight, and flexible solar cells adopting a film substrate.
  [Approx. 0.1g (depending on size)/0.2 mm or less]
- It has high power generation efficiency under fluorescent lamps and LED light sources, and is suitable as a power source for products used indoors.
- There is output stability in low light and dim light.
- Can be custom-designed according to various shapes and applications.

APPLICATION

- Clock
- Wearable device
- Beacon
- Wireless sensor node / various sensors / IoT terminal power supply
- Smart card
- Smart lock
- Energy harvesting (environmental) power generation element
- Charging and powering other electronic devices

ADVANTAGES OF SOLAR CELLS

- It reduces the cost of battery replacement and eliminates the hassle.
- Reduce the cost of electrical wiring.
- Extends the life of the primary battery. (When combining primary batteries)
- Extend the usage time of rechargeable devices.
- There is no equipment damage or environmental pollution due to liquid leakage.
- It contributes to improving the image of products by using clean energy.

PART NUMBER CONSTRUCTION

BCS	4430	B	6

Series name

For 4-digit numbers (LxW dimensions)

4430	44×30mm
4630	46×30mm
2717	27×17mm
1714	17×14mm
6040	60×40mm

When the alphabet is included (Product unique number)

C241
C451
C452

Shape type

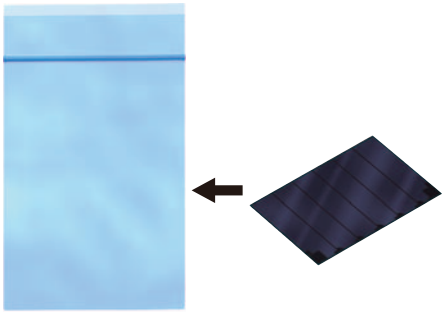
B	Quadrangle
D	Circular

Number of cells connected in series

2	2-cell series connection
3	3-cell series connection
4	4-cell series connection
6	6-cell series connection
7	7-cell series connection
9	9-cell series connection

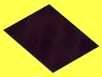
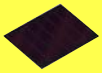
PACKAGING STYLE

Packed in antistatic bag



BCS series

PRODUCT LINEUP

Series name		Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
							Operating current	Operating voltage	Open circuit voltage
BCS4430B6		44×30mm	0.18mm	0.15mm	0.20g	6 cells	30μA	2.6V	4.2V
BCS2717B6		27×17mm	↑	↑	0.07g	6 cells	10μA	2.6V	4.2V
BCSC241D4		ø17mm	↑	↑	0.03g	4 cells	7.0μA	1.5V	2.8V
BCS4630B9		46×30mm	↑	↑	0.20g	9 cells	19μA	3.8V	6.3V
BCSC451B2		25×19mm	↑	↑	0.07g	2 cells	30μA	1.0V	1.4V
BCSC452B3		25×19mm	↑	↑	0.07g	3 cells	19μA	1.5V	2.1V
BCS2717B4		27×17mm	↑	↑	0.07g	4 cells	16μA	2.0V	2.8V
BCS1714B4		17×14mm	↑	↑	0.04g	4 cells	7.8μA	2.0V	2.8V
BCS1714B6		17×14mm	↑	↑	0.04g	6 cells	5.0μA	2.6V	4.2V
BCS6040B7		60×40mm	↑	↑	0.35g	7 cells	44μA	3.0V	4.9V

Background yellow: The product which is in preparation for mass production.

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
- Please contact our sales department, our distributors, or our website if you would like to consider using the product for mass production or request a custom design.

Measurement equipment

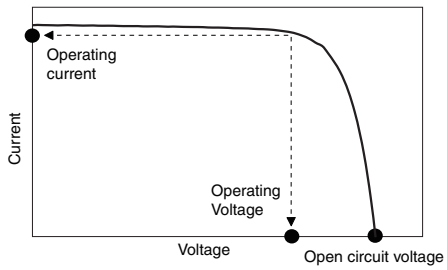
Measurement item	Product No.	Manufacturer
light source	White fluorescent lightFL-10W	TOSHIBA
Voltage・current	Source Meter 2400	KEITHLEY

＊ Equivalent measurement equipment may be used.

TEMPERATURE RANGE

Operating temperature range	Storage temperature range
–20 to +60 °C	–20 to +70 °C

OPEN CIRCUIT VOLTAGE



*Open circuit voltage (Voc): Voltage when terminals are open
*Operating voltage (Vop): Voltage when the device is connected
*Operating current (Iop): Current when device is connected

BCS4430B6

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	44×30mm	0.18mm	0.15mm	0.20g	6 cells	30μA	2.6V	4.2V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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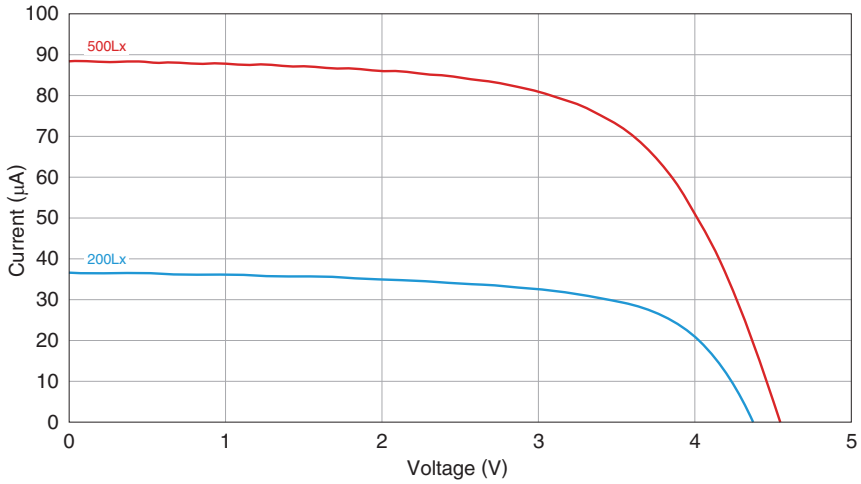
IV CHARACTERISTICS

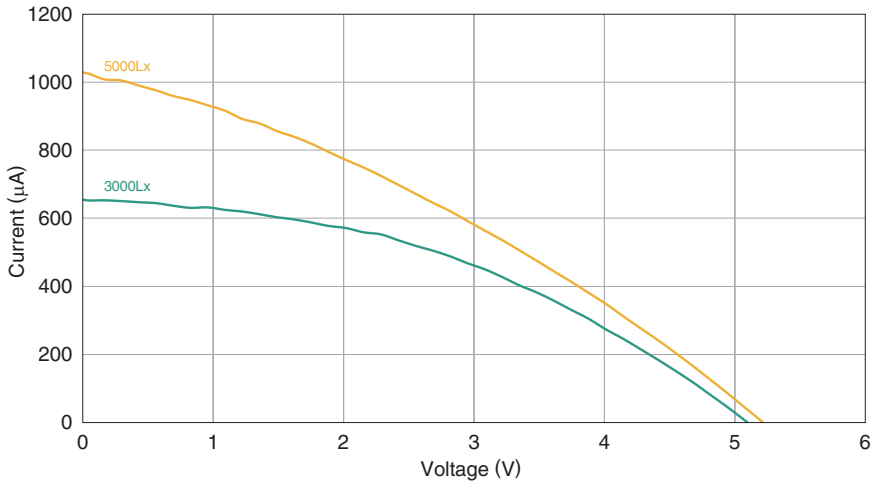
200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
200	4.2	30
500	4.4	80

Initial value at 25°C

3000Lx, 5000Lx



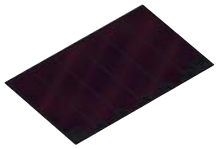
Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
3000	5.0	500
5000	5.1	640

Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

BCS2717B6

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	27×17mm	0.18mm	0.15mm	0.07g	6 cells	10μA	2.6V	4.2V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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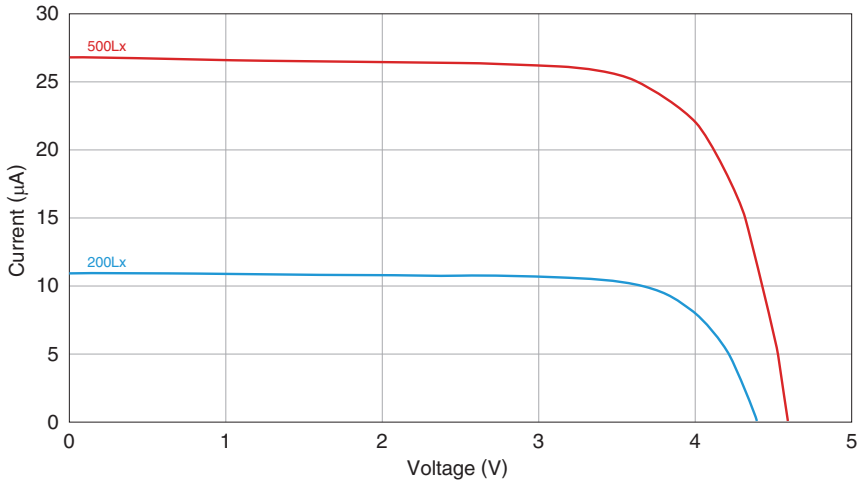
IV CHARACTERISTICS

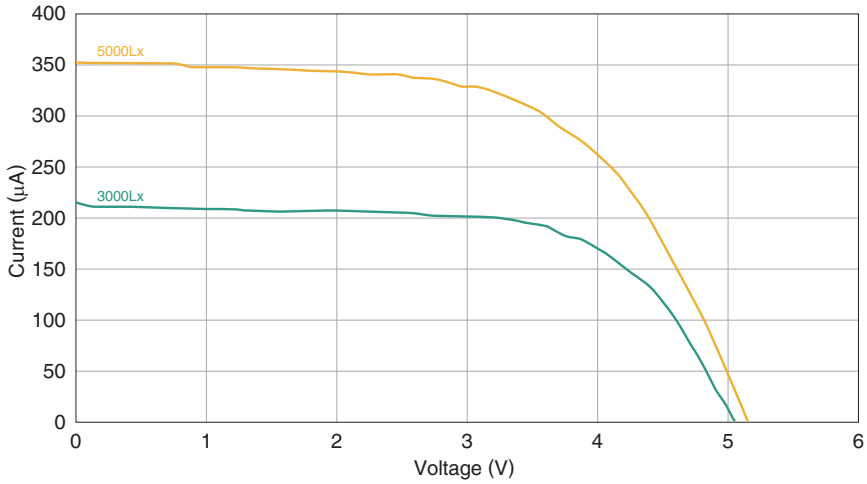
200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
200	4.2	10
500	4.4	25

Initial value at 25°C

3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
3000	5.0	200
5000	5.1	330

Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
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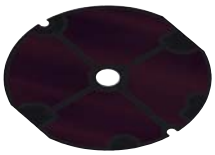
BCSC241D4

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	ø17mm	0.18mm	0.15mm	0.03g	4 cells	7.0μA	1.5V	2.8V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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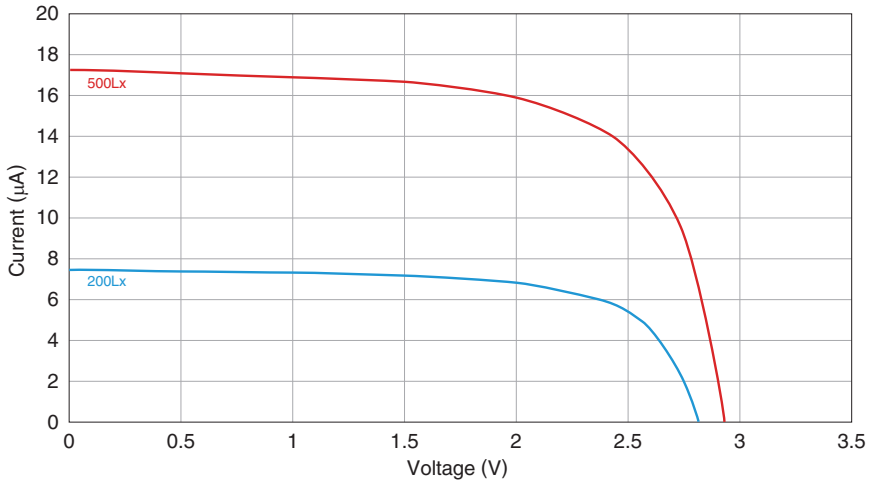
IV CHARACTERISTICS

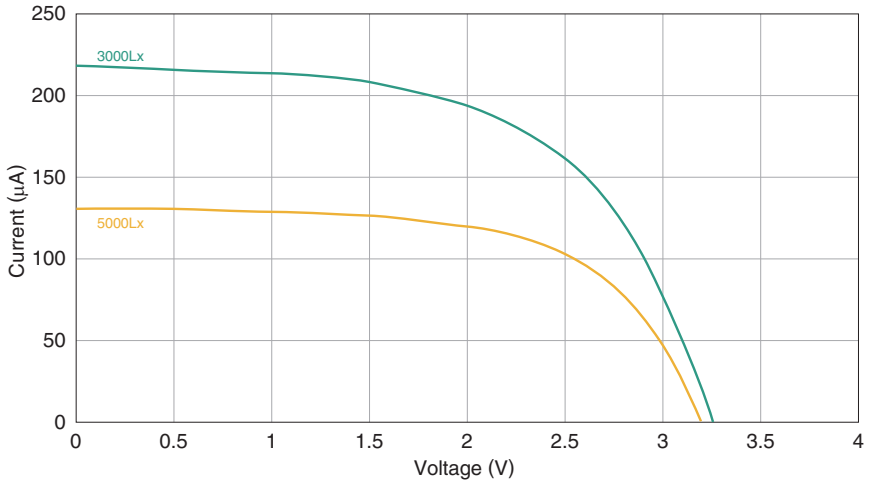
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop1.5V]
200	2.8	7.0
500	2.9	16

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop1.5V]
3000	3.2	120
5000	3.25	205

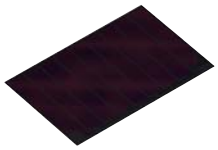
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCS4630B9

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	46×30mm	0.18mm	0.15mm	0.20g	9 cells	19μA	3.8V	6.3V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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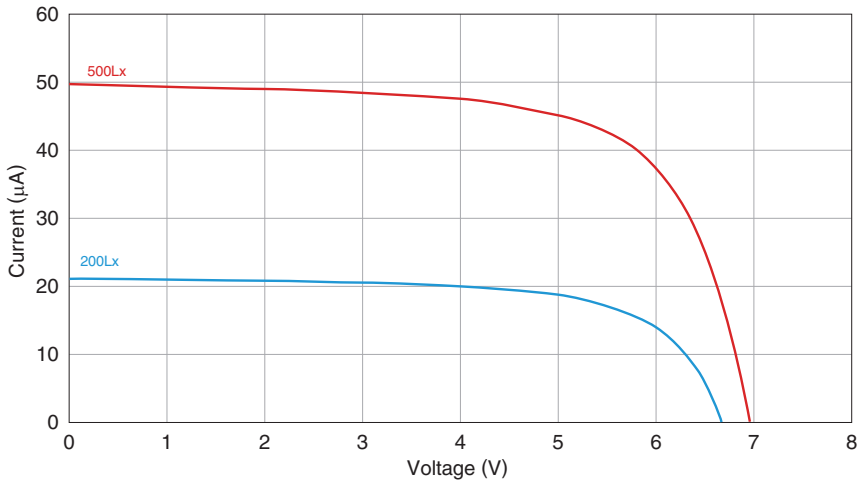
IV CHARACTERISTICS

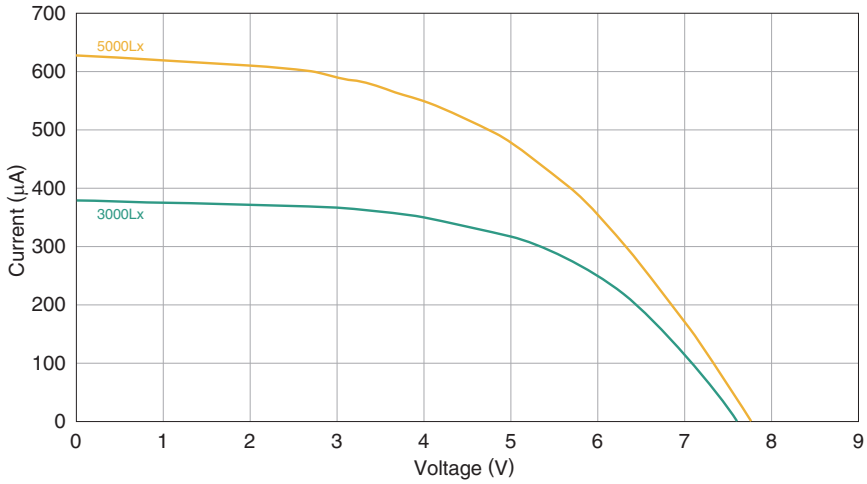
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop3.8V〕
200	6.3	19
500	6.7	47

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop3.8V〕
3000	7.6	355
5000	7.7	565

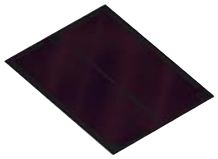
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCSC451B2

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	25×19mm	0.18mm	0.15mm	0.07g	2 cells	30μA	1.0V	1.4V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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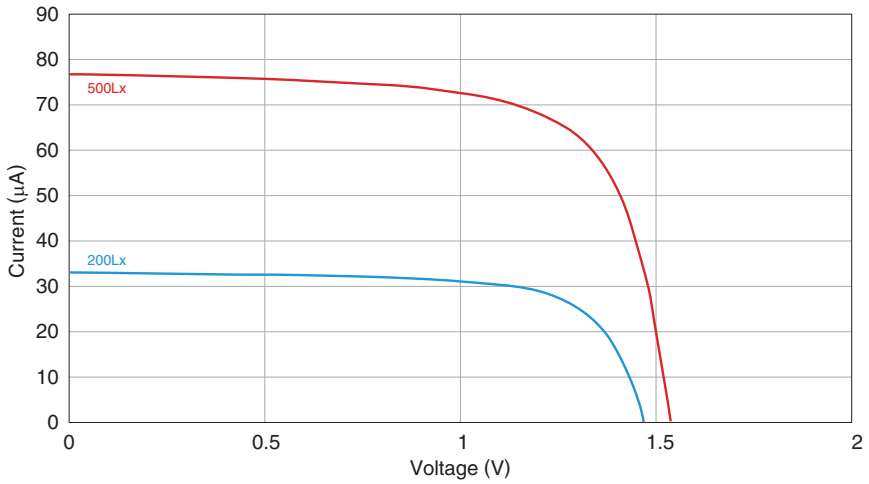
IV CHARACTERISTICS

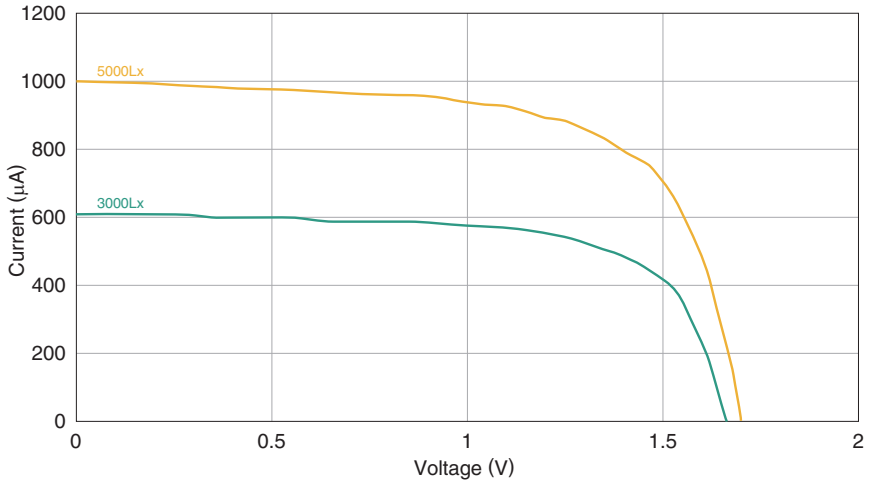
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop1.0V〕
200	1.4	30
500	1.5	70

Initial value at 25°C

□3000Lx, 5000Lx



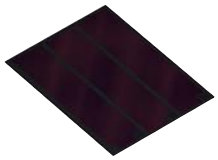
Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop1.0V〕
3000	1.68	580
5000	1.72	940

Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

BCSC452B3

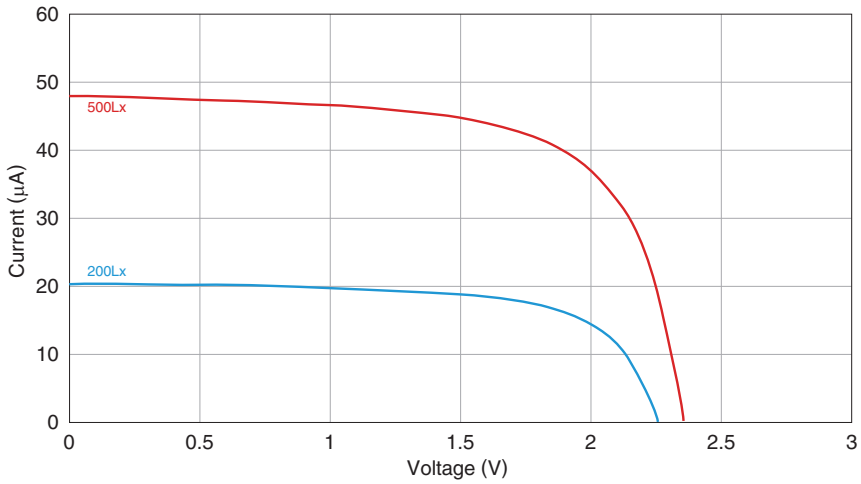
CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	25×19mm	0.18mm	0.15mm	0.07g	3 cells	19μA	1.5V	2.1V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
- Please contact our sales department, our distributors, or our website if you would like to consider using the product for mass production or request a custom design.

IV CHARACTERISTICS

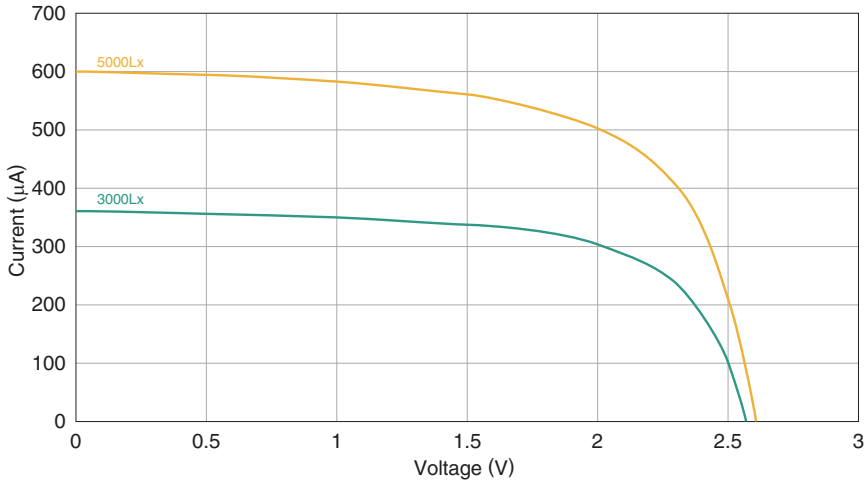
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop1.5V〕
200	2.1	19
500	2.2	44

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop1.5V〕
3000	2.55	330
5000	2.6	565

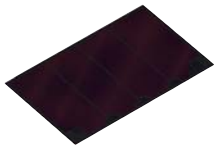
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCS2717B4

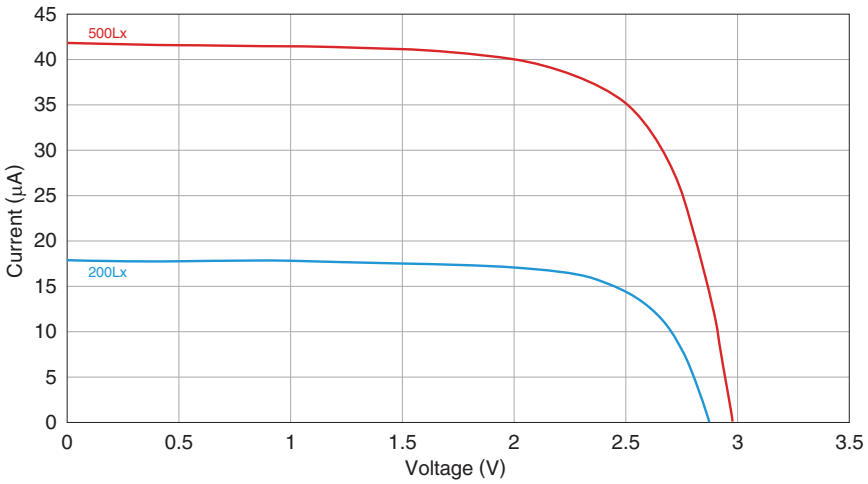
CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	27×17mm	0.18mm	0.15mm	0.07g	4 cells	16μA	2.0V	2.8V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
- Please contact our sales department, our distributors, or our website if you would like to consider using the product for mass production or request a custom design.

IV CHARACTERISTICS

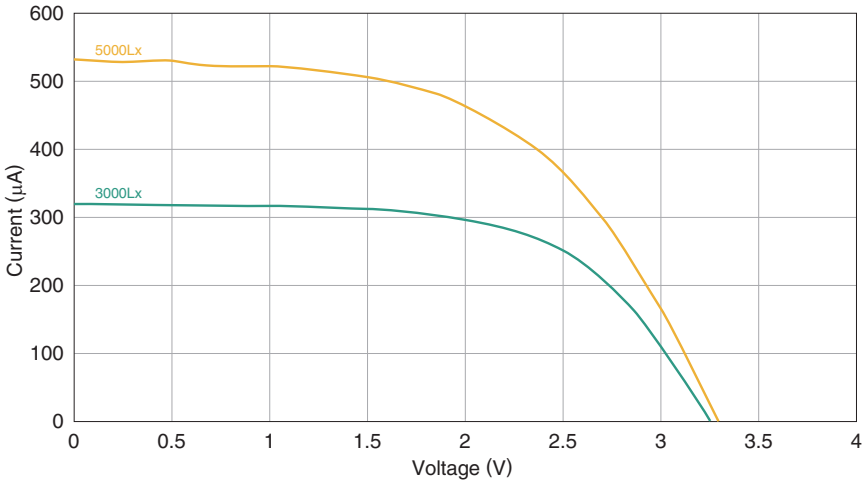
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop2.0V〕
200	2.8	16
500	2.9	38

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop2.0V〕
3000	3.2	290
5000	3.25	460

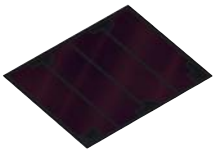
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCS1714B4

CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	17×14mm	0.18mm	0.15mm	0.04g	4 cells	7.8μA	2.0V	2.8V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
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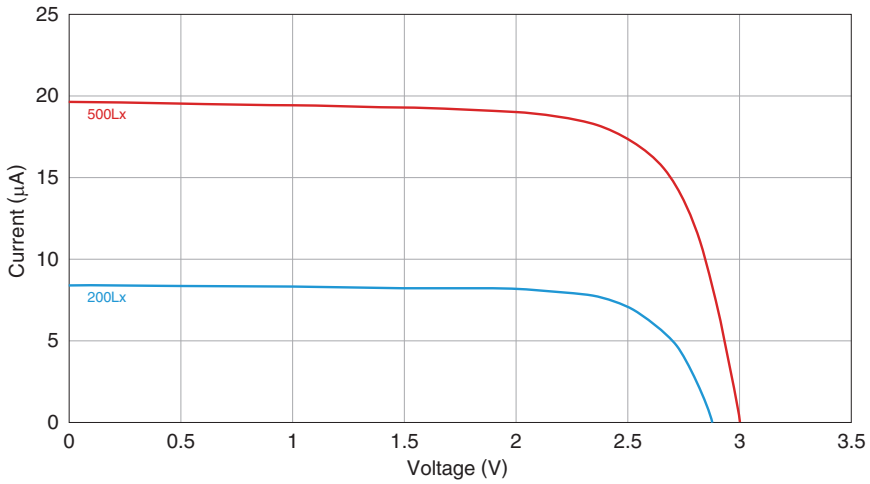
IV CHARACTERISTICS

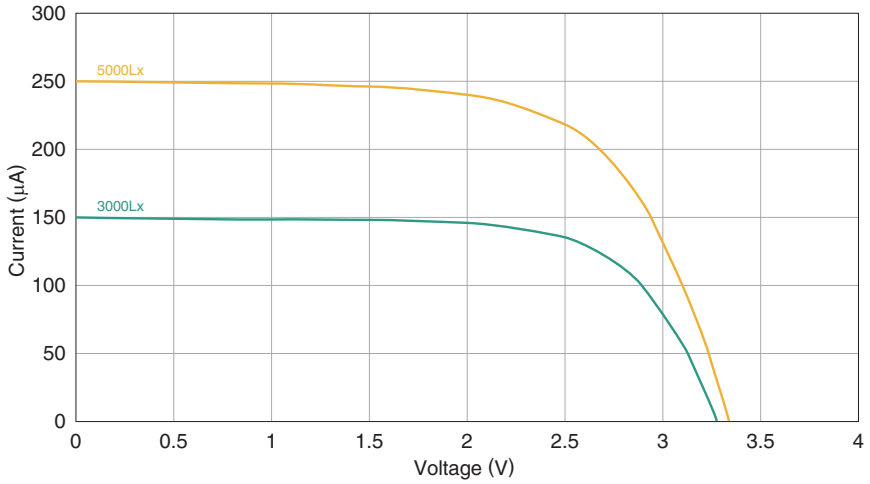
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop2.0V〕
200	2.8	7.8
500	2.9	18

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) 〔Vop2.0V〕
3000	3.2	140
5000	3.25	230

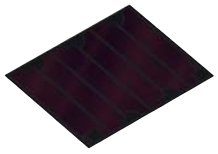
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCS1714B6

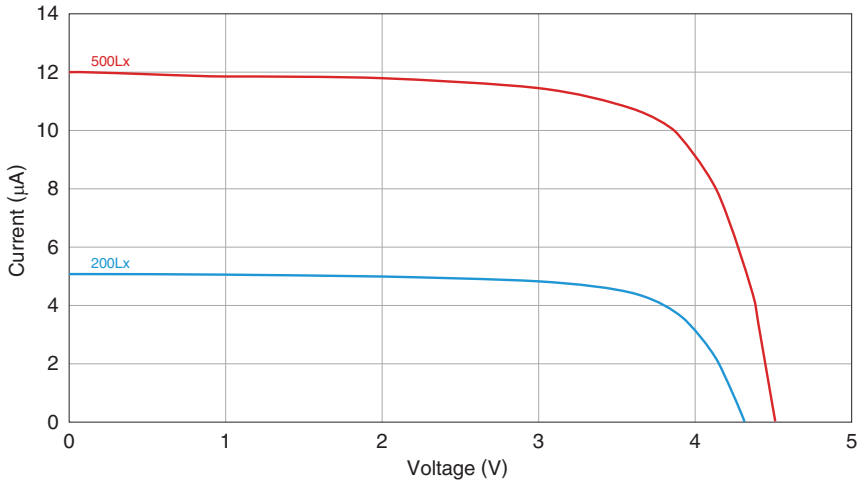
CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	17×14mm	0.18mm	0.15mm	0.04g	6 cells	5.0μA	2.6V	4.2V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
- Please contact our sales department, our distributors, or our website if you would like to consider using the product for mass production or request a custom design.

IV CHARACTERISTICS

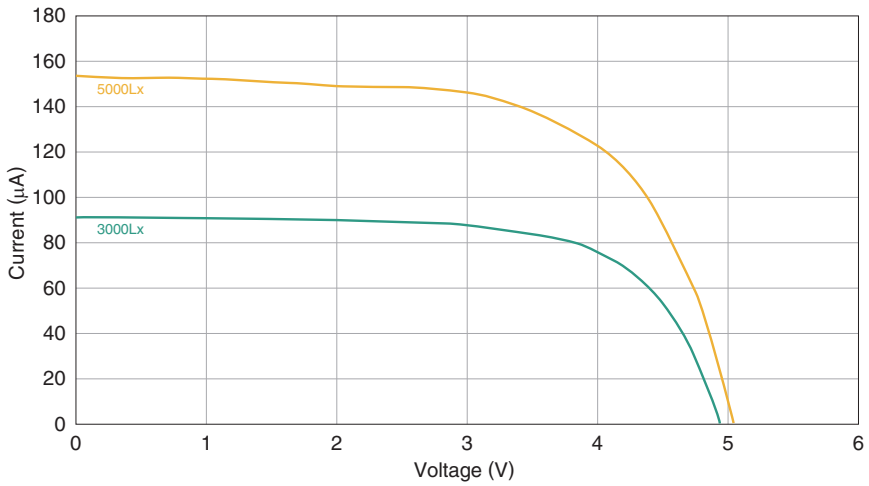
□200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
200	4.2	5.0
500	4.4	11

Initial value at 25°C

□3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop2.6V]
3000	5.0	90
5000	5.1	145

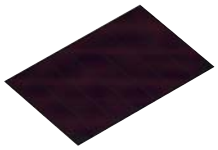
Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠This product is in preparation for mass production.

BCS6040B7

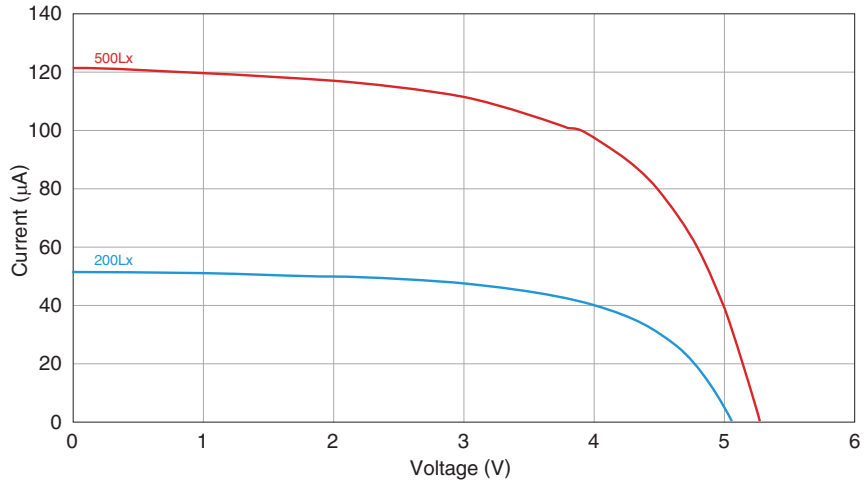
CHARACTERISTICS SPECIFICATION TABLE

	Product size	Thickness (Electrode part)	Thickness (Other)	Individual weight	Number of series cells	Output at illuminance 200Lx (Standard value)		
						Operating current	Operating voltage	Open circuit voltage
	60×40mm	0.18mm	0.15mm	0.35g	7 cells	44μA	3.0V	4.9V

- Standard output with initial value at 25°C. It is not guaranteed.
- The product thickness shows the typical value.
- The operating temperature range is -20 to +60°C. The characteristics vary depending on the operating temperature.
- Continuous light irradiation causes a decrease in output over time, called light deterioration, which is called light deterioration.
- Spring probes, heat seals and conductive adhesives are recommended for circuit connections.
- Please contact our sales department, our distributors, or our website if you would like to consider using the product for mass production or request a custom design.

IV CHARACTERISTICS

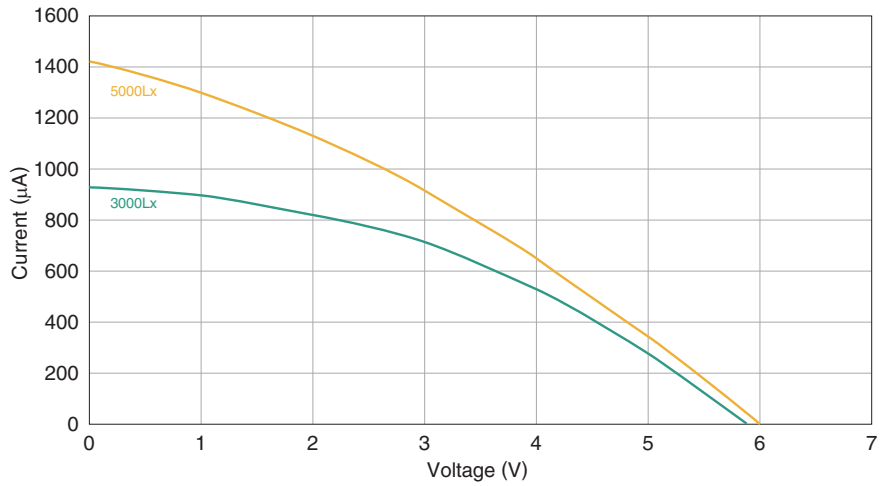
200Lx, 500Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop3.0V]
200	4.9	44
500	5.1	110

Initial value at 25°C

3000Lx, 5000Lx



Illuminance (Lx)	Open circuit voltage (V)	Operating current (μA) [Vop3.0V]
3000	5.8	710
5000	5.9	925

Initial value at 25°C

Note) It is not in the reference value of a guaranteed value.
The operating voltages and operating currents in the table are examples. It is different from the maximum output point.

⚠ HANDLING PRECAUTIONS

- Do not apply strong force, shock, or pressure due to external stress. If the product is scratched or cracked, an electrical short circuit may occur and the voltage may drop. Be careful when you touch the light-receiving surface or bend the product.
- If you have the product, please grasp the non-power generation part.
- Since it is sensitive to static electricity, please take necessary measures against static electricity when handling it.
- If the amount of light transmission decreases or the incident light area decreases due to dirt on the light-receiving surface, the output will decrease. Do not touch the light receiving surface with your bare hands.
- If the product is reused or reattached, it may be damaged due to scratches, cracks, dirt, electrostatic discharge, etc.
- If the productslightreceivingsurfaceisleftexposedtosunlight,thecharacteristicswilldeterioratedueto lightdeterioration.'
- Do not wash the product with water, solvents, detergents, etc. Also, make sure that these liquids do not come into contact.
- Do not touch with wet hands.
- Do not use or store in locations where there are conditions such as gas corrosion (salt, acid, alkali, etc.).
- Do not contact flammable gas, flammable liquid, or organic solvent.
- If dropped, the characteristics listed in the catalog may not be obtained.
- Do not supply external power to this product.
- When disposing, please follow the sorting method of each municipality.

⚠ DESIGN PRECAUTIONS

- This product is designed for indoor environment and low light use. The amount of power generation will vary greatly when used in an outdoor environment or under high illuminance. The reliability has not been confirmed in the outdoor environment and high illuminance characteristics.
- This product recommends spring contacts, conductive adhesives and heat seals for electrical connection to the circuit. Not suitable for soldering, reflow and ACF.
- The output may be reduced if the product is scratched or cracked. Take appropriate protection as needed.
- Protect the package according to the operating environment to prevent water intrusion, condensation, and light-receiving surface impact.
  For the package on the light receiving surface, use a material that transmits light. If the transmittance of the package on the light receiving surface becomes low, the output of the solar cell will decrease according to the transmittance.
- If there is a spot where the light receiving surface is not exposed to light, the amount of power generation will decrease. It is recommended to design the light so that it illuminates the entire light receiving surface.
- Irradiation with strong light causes a decrease in output called light deterioration. The degree of output reduction depends on the light intensity and irradiation time.
- Make sure that the built-in devices and circuits do not allow static electricity to flow into this product.
- Product characteristics show the characteristics when light is incident perpendicularly to the light receiving surface. The maximum output is at normal incidence, and the output decreases according to the incident angle of light.
- If necessary, connect a backflow prevention diode to prevent the flow of current from the storage device.
- When connecting multiple products in parallel, connect a bypass diode between the products if necessary.
- Please note that the generated voltage will increase when exposed to strong light such as sunlight.
- The output varies depending on the type of light source, even with the same illuminance.
- Do not heat the product above 150°C. Also, if the product is heated in a free state even below 150°C, the product warpage will increase depending on the temperature and time.
- The output has temperature dependence. When the product temperature rises, the behavior of voltage drop/current rise, and when the product temperature falls, behavior of voltage rise/current fall.
- The output may be reduced if dust or dirt adheres to the light receiving surface.
- When fixing the back side of the product with double-sided tape or adhesive, be careful of damage due to pressure or adhesive shrinkage.

- When connecting, make sure that the polarity is correct.
- Be careful not to touch the conductive parts on the end face of the product. Characteristic deterioration may occur.
- Before using the product, make sure that the characteristics of this product are suitable for the equipment and circuit to be incorporated.

⚠ REMINDERS

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(1) Aerospace/aviation equipment
(2) Transportation equipment (cars, electric trains, ships, etc.)
(3) Medical equipment
(4) Power-generation control equipment
(5) Atomic energy-related equipment
(6) Seabed equipment
(7) Transportation control equipment
(8) Public information-processing equipment
(9) Military equipment
(10) Electric heating apparatus, burning equipment
(11) Disaster prevention/crime prevention equipment
(12) Safety equipment
(13) Other applications that are not considered general-purpose applications

When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.