photocells

Features

- Lowest-cost visible detector
- Available in low-cost plastic-encapsulated packages as well as hermetic packages (TO-46, TO-5, TO-8)
- Responsive to both very low light levels (moonlight) and to very high light levels (direct sunlight)
- Wide dynamic range: resistance changes of several orders of magnitude between "light" and "no light"
- Low noise distortion
- Maximum operating voltages of 50 to 400 volts are suitable for operation on 120/240 VAC
- Available in center-tap dual-cell configurations as well as specially selected resistance ranges for special applications
- Easy to use in DC or AC circuits
- Usable with almost any visible or near-infrared light source such as LEDS; neon; fluorescent, incandescent bulbs, lasers; flame sources; sunlight; etc.
- Available in a wide range of resistance values

Typical Analog Applications

- Camera Exposure Control
- Auto-Focus for Slide Projector
- Colorimetric Test Equipment
- Densitometer
- Electronic Scales—dual-cell
- Automated Rear-View Mirror

Typical Digital Applications

- Automatic Headlight Dimmer
- Night Light Control
- Oil Burner Flame Out
- Street Light Control
- Absence/Presence (beam breaker)
- Position Sensor

Datasheets available upon request

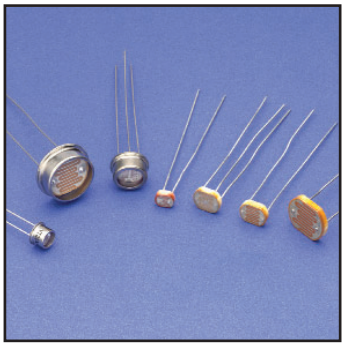
Description

Photocells or Light-Dependent Resistors can provide a very economical and technically superior solution for many applications where the presence or absence of light is sensed (digital operation) or where the intensity of light needs to be measured (analog operation).

Semiconductor light detectors can be divided into two major categories: junction and bulk-effect devices. Junction devices, when operated in the photoconductive mode, utilize the reverse characteristic of a PN junction. Under reverse bias, the PN junction acts as a light-controlled current source. Output is proportional to incident illumination and is relatively independent of applied voltage. Silicon photodiodes are examples of this type of detector.

In contrast, bulk-effect photoconductors have no junction. The bulk resistivity decreases with increasing illumination, allowing more photocurrent to flow. This resistive characteristic gives bulk-effect photoconductors a unique quality: signal current from the detector can be varied over a wide range by adjusting the applied voltage. To clearly make this distinction, PerkinElmer Optoelectronics refers to its bulk-effect photoconductors as photoconductive cells or, simply, photocells.

Photocells are thin-film devices made by depositing a layer of a photoconductive material on a ceramic substrate. Metal contacts are evaporated over the surface of the photoconductor and external electrical connection is made to these contacts. These thin films of photoconductive material have a high sheet resistance. Therefore, the space between the two contacts is made narrow and interdigitated for low cell resistance at moderate light levels.



VT Series

VT Series

Technical Specification

Part Number	Resistance (Ohms) 10 lux 2850 K min.	typ.	max.	2 fc 2850 K typ.	Dark min.	sec.	Material Type	Sensitivity (γ, typ.) LOG (R10/R100) / LOG (100/10)	Max. Volts V, pk	Response Time @ 1fc ms, typ. Rise (1-1/e)	Fall (1/e)
VT20N1	8 k	16 k	24 k	8 k	200 k	5	0	0.8	100	78	8
VT20N2	16 k	34 k	52 k	17 k	500 k	5	0	0.8	100	78	8
VT20N3	36 k	72 k	108 k	36 k	1 M	5	0	0.8	100	78	8
VT20N4	76 k	152 k	230 k	76 k	2 M	5	0	0.8	200	78	8
VT23N1	20 k	40 k	60 k	20 k	500 k	5	3	0.85	100	35	5
VT23N2	42 k	86 k	130 k	43 k	1 M	5	3	0.85	100	35	5
VT23N3	90 k	180 k	270 k	90 k	2 M	5	3	0.85	100	35	5
VT30N1	6 k	12 k	18 k	6 k	200 k	5	0	0.75	100	78	8
VT30N2	12 k	24 k	36 k	12 k	500 k	5	0	0.8	200	78	8
VT30N3	24 k	48 k	72 k	24 k	1 M	5	0	0.8	200	78	8
VT30N4	50 k	100 k	150 k	50 k	2 M	5	0	0.8	300	78	8
VT33N1	20 k	40 k	60 k	20 k	500 k	5	3	0.9	100	35	5
VT33N2	40 k	80 k	120 k	40 k	1 M	5	3	0.9	200	35	5
VT33N3	80 k	160 k	240 k	80 k	2 M	5	3	0.9	200	35	5
VT30CT	10 k	20 k	30 k	10 k	500 k	5	0	0.8	200	78	8
VT33CT	60 k	120 k	180 k	60 k	1 M	5	3	0.9	200	35	5
VT50N1	4 k	8 k	12 k	4 k	200 k	5	0	0.75	200	78	8
VT50N2	8 k	16 k	24 k	8 k	500 k	5	0	0.75	200	78	8
VT50N3	16 k	32 k	48 k	16 k	1 M	5	0	0.8	300	78	8
VT53N1	16 k	32 k	48 k	16 k	1 M	5	3	0.85	200	35	5
VT53N2	32 k	76 k	96 k	38 k	2 M	5	3	0.85	200	35	5
VT53N3	66 k	132 k	200 k	66 k	3 M	5	3	0.85	300	35	5
VT80N1	4 k	8 k	12 k	4 k	100 k	5	0	0.8	100	78	8
VT80N2	8 k	16 k	24 k	8 k	500 k	5	0	0.8	200	78	8
VT83N1	6 k	12 k	18 k	6 k	100 k	5	3	0.95	100	35	5
VT83N2	12 k	28 k	36 k	14 k	500 k	5	3	0.95	200	35	5
VT83N3	24 k	48 k	72 k	24k	1 M	5	3	0.95	200	35	5
VT83N4	50 k	100 k	150 k	50 k	2 M	5	3	0.95	200	35	5
VT83CT	30 k	60 k	90 k	30 k	1 M	5	3	0.90	100	35	5
VT90N1	6 k	12 k	18 k	6 k	200 k	5	0	0.8	100	78	8
VT90N2	12 k	24 k	36 k	12 k	500 k	5	0	0.8	100	78	8
VT90N3	25 k	50 k	75 k	25 k	1 M	5	0	0.85	100	78	8
VT90N4	50 k	100 k	150 k	50 k	2 M	5	0	0.9	100	78	8
VT93N1	12 k	24 k	36 k	12 k	300 k	5	3	0.9	100	35	5
VT93N2	24 k	48 k	72 k	24 k	500 k	5	3	0.9	100	35	5
VT93N3	50 k	100 k	150 k	50 k	500 k	5	3	0.9	100	35	5
VT93N4	100 k	200 k	300 k	100 k	500 k	5	3	0.9	100	35	5
VT935G-A	10 k	18.5 k	27 k	9.3 k	1 M	5	3	0.9	100	35	5
VT935G-B	20 k	29 k	38 k	15 k	1 M	5	3	0.9	100	35	5
VT935G-C	31 k	40.5 k	50 k	20 k	1 M	5	3	0.9	100	35	5

Specification Notes

Photocells categorized into groups by resistance. All groups must be purchased together and PerkinElmer maintains the right to determine the product mix among these groups.

Dimensions controlled at base of package.

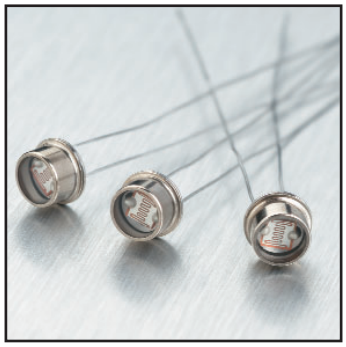
Photocells are tested at either 1 fc or 10 lux. 2 fc. typical values shown in the tables are for reference only.

Cells are light-adapted at 30–50 fc.

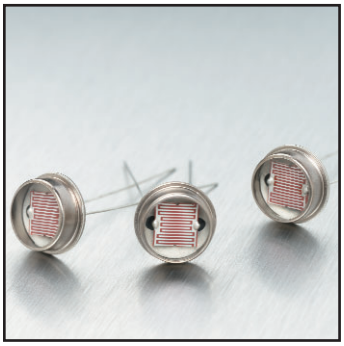
The photocell "grid" pattern can vary from that shown. PerkinElmer reserves the right to change mix grid patterns on any standard product.

The resistance for any standard cell is controlled at only one light level. If the resistance at other light levels is a concern, please contact the factory.

photocells



A10 Series



B90 Series

Table Key

R 10	Resistance at E=10 lux light intensity
R 100	Resistance at E=100 lux light intensity
R_{01}	Dark Resistance after 1 sec (E=0)
R_{05}	Dark Resistance after 5 sec (E=0)
$\gamma_{10/100}$	Sensitivity log (R10/R100)/ log (100 lux/10 lux)
λ_{peak}	Peak Spectral Sensitivity
Top	Operating Temperature
Tst	Storage Temperature
TC	Thermal Coefficient
ton	Rise Time to 63% of final I (R_{10})
toff	Decay Time to 37% of initial I (R_{10})
Vmax	Maximum Operating Voltage at E=0 lux
Pmax	Power Dissipation at 25°C Ambient Temperature

VT43 Series

Technical Specification

Part Number	Resistance (Ω) 1 fc 6500 K min.	typ.	max.	2 fc 2850 K typ.	Dark min.	sec.	Sensitivity (γ, typ.) Material Type	LOG (R10/R100) LOG (100/10)	Max. Volts V, pk	Response Time @ fc ms, typ. Rise (1-1/e)	Fall (1/e)
VT43N1	4 k	8 k	12 k	—	300 k	30	3	0.9	250	90	18
VT43N2	8 k	16 k	24 k	—	300 k	30	3	0.9	250	90	18
VT43N3	16 k	32 k	48 k	—	500 k	30	3	0.9	400	90	18
VT43N4	33 k	66 k	100 k	—	500 k	30	3	0.9	400	90	18

A10 Series

Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 range kΩ	R100 typ. kΩ	R_{01} min. MΩ	R_{05} min. MΩ	$\gamma_{10/100}$ typ.	λ_{peak} nm	Limit Values Top range °C	Tst range °C	TC 10 lux %/°k	ton typ. msec	toff typ. msec	Vmax. V	Pmax. mW
A106009	4-11	2	0.04	0.12	0.65	600	-20-+70	-20-+80	0.4	50	40	100	90
A106011	9-20	3.5	0.06	0.18	0.65	600	-20-+70	-20-+80	0.3	60	40	150	90
A106012	16-33	5	0.18	0.5	0.7	600	-20-+70	-20-+80	0.35	50	35	150	90
A106013	27-94	8	0.5	1.5	0.8	600	-20-+70	-20-+80	0.4	35	30	150	90
A106014	77-340	15	1.5	5	0.9	600	-20-+70	-20-+80	0.5	25	20	150	90
A106031	60-130	23	0.4	1.2	0.65	600	-20-+70	-20-+80	0.3	60	40	300	90
A106032	120-210	35	1	3	0.7	600	-20-+70	-20-+80	0.35	50	35	300	90
A106033	200-580	50	3	9	0.8	600	-20-+70	-20-+80	0.4	35	30	300	90
A106034	500-1200	100	5	15	0.9	600	-20-+70	-20-+80	0.5	25	20	300	90
A105009	4-11	2	0.04	0.12	0.65	530	-20-+70	-20-+80	0.3	70	50	100	90
A105011	9-22	4	0.05	0.15	0.6	530	-20-+70	-20-+80	0.2	70	50	150	90
A105012	18-44	7	0.15	0.45	0.65	530	-20-+70	-20-+80	0.2	60	40	150	90
A105013	36-88	12	0.4	1.2	0.7	530	-20-+70	-20-+80	0.3	50	30	150	90
A105014	70-200	20	1	3	0.75	530	-20-+70	-20-+80	0.3	40	30	150	90

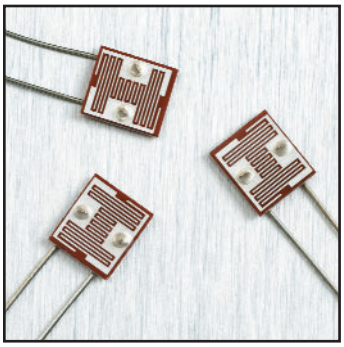
All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux

A90 Series

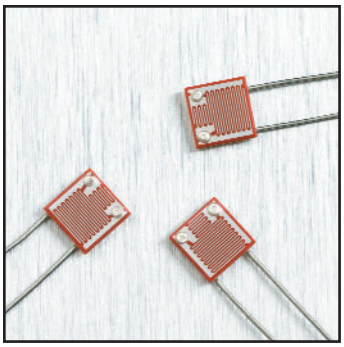
Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 range kΩ	R100 typ. kΩ	R_{01} min. MΩ	R_{05} min. MΩ	$\gamma_{10/100}$ typ.	λ_{peak} nm	Limit Values Top range °C	Tst range °C	TC 10 lux %/°k	ton typ. msec	toff typ. msec	Vmax. V	Pmax. mW
A906009	4-11	2	0.04	0.12	0.65	600	-20-+70	-20-+80	0.4	50	40	100	90
A906011	9-20	3.5	0.06	0.18	0.65	600	-20-+70	-20-+80	0.3	60	40	150	90
A906012	16-33	5	0.18	0.5	0.7	600	-20-+70	-20-+80	0.35	50	35	150	90
A906013	27-94	8	0.5	1.5	0.8	600	-20-+70	-20-+80	0.4	35	30	150	90
A906014	77-340	15	1.5	5	0.9	600	-20-+70	-20-+80	0.5	25	20	150	90
A906031	60-130	23	0.4	1.2	0.65	600	-20-+70	-20-+80	0.3	60	40	300	90
A906032	120-210	35	1	3	0.7	600	-20-+70	-20-+80	0.35	50	35	300	90
A906033	200-580	50	3	9	0.8	600	-20-+70	-20-+80	0.4	35	30	300	90
A906034	500-1200	100	5	15	0.9	600	-20-+70	-20-+80	0.5	25	20	300	90
A905012	18-44	7	0.15	0.45	0.65	530	-20-+70	-20-+80	0.2	60	40	150	90
A905013	36-88	12	0.4	1.2	0.7	530	-20-+70	-20-+80	0.3	50	30	150	90
A905014	70-200	20	1	3	0.75	530	-20-+70	-20-+80	0.3	40	30	150	90
A995009	4-11	2	0.04	0.12	0.65	530	-20-+70	-20-+80	0.3	70	50	100	90
A995011	9-22	4	0.05	0.15	0.6	530	-20-+70	-20-+80	0.2	70	50	150	90
A995012	18-44	7	0.15	0.45	0.65	530	-20-+70	-20-+80	0.2	60	40	150	90
A995013	36-88	12	0.4	1.2	0.7	530	-20-+70	-20-+80	0.3	50	30	150	90
A995014	70-200	20	1	3	0.75	530	-20-+70	-20-+80	0.3	40	30	150	90

All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux



D Series



M Series

U Series

B Series

Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 range kΩ	R100 typ. kΩ	R01 min. MΩ	R05 min. MΩ	$\gamma_{10/100}$ typ.	λ_{peak} nm	Limit Values Top range °C	Tst range °C	TC 10 lux %/°k	ton typ. msec	toff typ. msec	Vmax. V	Pmax. mW
B906023	4-15	1.6	0.1	0.3	0.8	600	-20-+70	-20-+80	0.4	35	30	300	200
B906032	5-13	2	0.1	0.3	0.7	600	-20-+70	-20-+80	0.3	50	35	300	200
B906033	11-40	5	0.2	0.6	0.8	600	-20-+70	-20-+80	0.4	35	25	300	200

All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux

D Series

Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 range kΩ	R100 typ. kΩ	R01 min. MΩ	R05 min. MΩ	$\gamma_{10/100}$ typ.	λ_{peak} nm	Limit Values Top range °C	Tst range °C	TC 10 lux %/°k	ton typ. msec	toff typ. msec	Vmax. V	Pmax. mW
D996011	1.5-3	0.6	0.01	0.03	0.6	600	-20-+70	-20-+80	0.3	60	35	150	200
D996012	2.8-6	0.8	0.03	0.09	0.7	600	-20-+70	-20-+80	0.35	50	30	150	200
D996013	4.5-13	1.5	0.1	0.3	0.8	600	-20-+70	-20-+80	0.4	35	25	150	200
D996021	4-9	1.8	0.03	0.09	0.6	600	-20-+70	-20-+80	0.3	60	35	150	200
D996022	8-15	2.5	0.09	0.27	0.7	600	-20-+70	-20-+80	0.35	50	30	150	200
D996023	12-35	4	0.5	1.5	0.8	600	-20-+70	-20-+80	0.4	35	25	150	200

All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux

M Series

Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 range kΩ	R100 typ. kΩ	R01 min. MΩ	R05 min. MΩ	$\gamma_{10/100}$ typ.	λ_{peak} nm	Limit Values Top range °C	Tst range °C	TC 10 lux %/°k	ton typ. msec	toff typ. msec	Vmax. V	Pmax. mW
M996011a	1.5-5	0.7	0.05	0.15	0.7	600	-20-+70	-20-+80	0.3	50	30	100	200
M996011b	0.8-2	0.4	0.05	0.15	0.65	600	-20-+70	-20-+80	0.3	40	30	100	200

All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux

U Series

Technical Specification

Part Number	Typical Electro-Optical Characteristics R10 kΩ	R100 typ. kΩ	R01 min. mΩ	R05 min. mΩ	$\gamma_{10/10}$ min.	λ_{peak} nm	Limit Values top *range* °C	tst range °C	TC 10 lux %/°K	ton typ. msec	toff typ. msec	Vmax V	Pmax mW
U116012	20-50	8	0.12	0.36	0.7	550	-20-+70	-20-+80	0.3	50	40	150	50
U116013	35-220	15	0.4	1.2	0.85	550	-20-+70	-20-+80	0.35	40	30	150	50
U116014	150-1000	35	1	3	0.95	550	-20-+70	-20-+80	0.4	30	25	150	50
U116032	100-320	40	1	3	0.7	550	-20-+70	-20-+80	0.3	40	30	400	50
U116033	250-1100	75	2	6	0.85	550	-20-+70	-20-+80	0.35	30	25	400	50

All readings taken at standard light A (2854 K color temperature) after 2 hours of preillumination at 500 lux