Ambient Light Sensors



Ambient light sensors are used to detect light or brightness in a manner similar to the human eye. They are most commonly found in industrial lighting, consumer electronics, and automotive systems, where they allow settings to be adjusted automatically in response to changing ambient light conditions. By turning on, turning off, or adjusting features, ambient light sensors can conserve battery power or provide extra safety while eliminating the need for manual adjustments.

RESOURCES

- Complete listing of Ambient Light Sensors: http://www.vishay.com/photo-detectors/ambient-light-sensor/
- Complete listing of photodiode products: http://www.vishay.com/photo-detectors/photodie-out/
- Complete listing of phototransistor products: http://www.vishay.com/photo-detectors/phototrans-out/
- Optical Sensors portfolio: http://www.vishay.com/optical-sensors/
- Optoelectronics portfolio: http://www.vishay.com/optoelectronics/
- For technical questions, contact detectortechsupport@vishay.com
- Sales contacts: http://www.vishay.com/doc?99914

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Illuminance

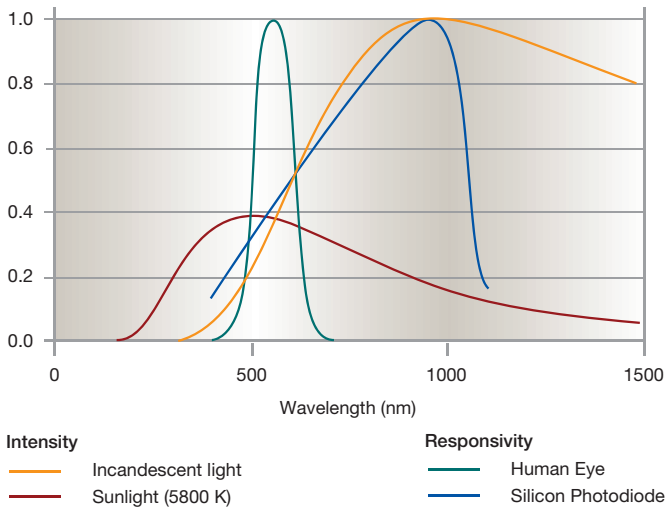
Illuminance is the measure of the intensity of light incident on a surface and can be correlated to the brightness perceived by the human eye. In the visible range, it is measured in units called “lux”. Light sources with the same lux measurement appear to be equally bright.

Light Source	Illuminance (Lux)
Street Light	20
Dusk	1 to 100
Living Room	50 to 200
Office	200 to 600
Operating Room	5 k to 10 k
Cloudy	2 k to 10 k
Hazy	25 k to 50 k
Bright Sun	50 k to 100 k

In the diagram below, the incandescent light and sunlight have been scaled to have the same lux measurement. In the infrared region, the intensity of the incandescent light is significantly higher. A standard silicon photodetector is much more sensitive to infrared light than visible light. Using it to measure ambient light will result in serious deviations between the lux measurements of different light sources and human-eye perception. Using Vishay’s ambient light sensors will solve this problem because they are most sensitive to the visible part of the spectrum.

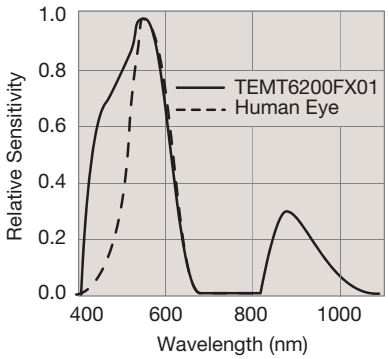
Spectral Sensitivity

The human eye can see light with wavelengths from 380 nm to 780 nm. Vishay’s ambient light sensors closely match this range of sensitivity.



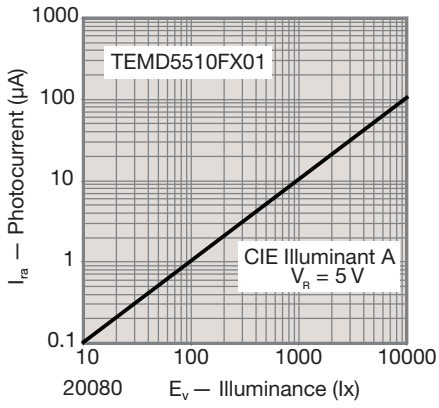
Linearity

The response of an ambient light sensor should be linear. Vishay’s ambient light sensors are linear from 10 lux to 100 klx. Photodiode output typically requires amplification while phototransistor output may not.



Output Variability

Vishay offers phototransistor- and photodiode-based ambient light sensors. For a given irradiance, phototransistors may show lot-to-lot variability of the output current caused by variability of the photosensitivity and gain. In most applications, this is not a problem. The lot-to-lot variability of photodiodes is significantly lower because it is caused only by the variability of the photosensitivity. A digital photodiode-based ambient light sensor complements Vishys portfolio. It has an excellent V(λ) matched spectral responsitivity and provides a high-resolution 16-bit I²C output signal.



Reverse Light Current vs. Irradiance

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

OPTOELECTRONICS

Sensors

Part Number	Mounting	Size (mm)	Peak Wavelength (nm)	Bandwidth (nm)	Angle of Half Sensitivity (±°)	Light Current[1] Standard A (µA)	Light Current[2] Fluorescent (µA)
Photodiode Output							
TEMD6010FX01	SMD	2.0 x 4.0 x 1.0	540	430 - 610	60	0.04	0.03
TEMD5510FX01	SMD	4.2 x 5.0 x 1.1	540	430 - 610	65	1.00	0.70
TEMD6200FX01	SMD	1.2 x 2.0 x 0.85	540	430 - 610	60	0.04	0.03
BPW21R	Leaded	TO5 - 8 mm	565	420 - 675	50	0.9	0.75
Phototransistor Output							
TEMT6200FX01	SMD	1.2 x 2.0 x 0.85	550	450 - 610	60	12	7
TEMT6000X01	SMD	2.0 x 4.0 x 1.0	570	430 - 800	60	50	21
TEPT5700	Leaded	5 mm, flat top	570	430 - 800	50	75	31
TEPT5600	Leaded	5 mm	570	430 - 800	20	350	145
TEPT4400	Leaded	3 mm	570	430 - 800	30	200	83

[1] E_v = 100 lux, V_{CE} = 5 V, CIE Illuminant A, typical

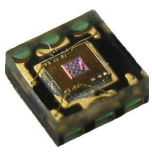
[2] E_v = 100 lux, V_{CE} = 5 V, e.g., Sylvania color abbrev. D830, typical

Part number	Mounting	Size (mm)	Ambient light range (lx)	Operating voltage range (V)	I²C bus voltage range (V)	Ambient light resolution (lx)	Output code
I²C Output							
VEML6030X01[3]	SMD	2.0 x 2.0 x 0.85	0 to 7200	2.3 to 3.6	1.7 to 5.0	0.002	16-bit, I²C

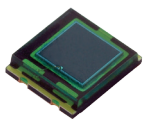
[3] Pending release

F Part numbers with an F contain an infrared filtering epoxy to further improve the ambient light sensing performance

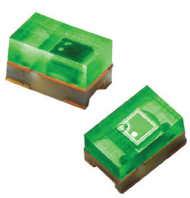
X01 Part numbers with an X01 are qualified to the AEC Q101 standard and support operating temperatures from - 40 °C to + 100 °C



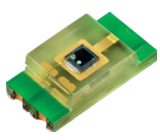
VEML6030X01



TEMD5510FX01



TEMT6200FX01
TEMD6200FX01



TEMD6010FX01
TEMT6000X01



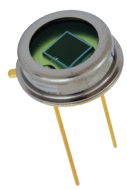
TEPT5600



TEPT4400



TEPT5700



BPW21R

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

WORLDWIDE SALES CONTACTS

THE AMERICAS

UNITED STATES
VISHAY AMERICAS
ONE GREENWICH PLACE
SHELTON, CT 06484
UNITED STATES
PH: +1-402-563-6866
FAX: +1-402-563-6296

ASIA

SINGAPORE
VISHAY INTERTECHNOLOGY ASIA PTE LTD.
37A TAMPINES STREET 92 #07-00
SINGAPORE 528886
PH: +65-6788-6668
FAX: +65-6788-0988

P.R. CHINA
VISHAY CHINA CO., LTD.
15D, SUN TONG INFOPORT PLAZA
55 HUAI HAI WEST ROAD
SHANGHAI 200030
P.R. CHINA
PH: +86-21-5258 5000
FAX: +86-21-5258 7979

JAPAN
VISHAY JAPAN CO., LTD.
SHIBUYA PRESTIGE BLDG. 4F
3-12-22, SHIBUYA
SHIBUYA-KU
TOKYO 150-0002
JAPAN
PH: +81-3-5466-7150
FAX: +81-3-5466-7160

EUROPE

GERMANY
VISHAY ELECTRONIC GMBH
DR.-FELIX-ZANDMAN-PLATZ 1
95100 SELB
GERMANY
PH: +49-9287-71-0
FAX: +49-9287-70435

FRANCE
VISHAY S.A.
199, BD DE LA MADELEINE
06003 NICE, CEDEX 1
FRANCE
PH: +33-4-9337-2727
FAX: +33-4-9337-2726

UNITED KINGDOM
VISHAY LTD.
SUITE 6C, TOWER HOUSE
ST. CATHERINE'S COURT
SUNDERLAND ENTERPRISE PARK
SUNDERLAND SR5 3XJ
UNITED KINGDOM
PH: +44-191-516-8584
FAX: +44-191-549-9556

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Unikeyic Electronics

Global Electronic Components Distributor

Click to view pricing, inventory, delivery, and lifecycle information:

Vishay Intertechnology:

WSL27265L000FEB 1.5SMC91A-E3/57T CCF5510K0FKE36 ILHB1806ER600V ISOA200R11003JT
PR03000204700JAC00 SQD50P08-28_GE3 WSL2512R0300FTB 293D337X96R3D2T-E3
CRCW1206510KFKEA RCL12183R30FKEK PR02000204709JA100 SMBJ12CA-E3/52
PR01000101603JR500 SUD50P04-08-GE3 CRCW1206270KJNEA SS2FN6HM3/H SE20DLGHM3/I
CRCW040213K0FKTD LTO150H470R0JTE3 PTCCL05H280HTE PTF5610K000BYEK RS0105R000FE12
BRT13-H-X006 CRCW2512150RFKEGHP LTO150H2R200JTE3 SM8S43AHE3_A/I VS-50RIA60
CRCW08051M00FKEA MSS2P3-M3/89A